

## **APPENDIX H**

### **Traffic Studies – Spot Speed Study**

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# VEHICLE SPOT SPEED STUDY

| SPEED RANGES               | NUMBER OF VEHICLES | PERCENT OF TOTAL | PERCENT ACCUMULATION |
|----------------------------|--------------------|------------------|----------------------|
| 20                         | 0                  | 0.0%             | 0.0%                 |
| 21                         | 0                  | 0.0%             | 0.0%                 |
| 22                         | 0                  | 0.0%             | 0.0%                 |
| 23                         | 0                  | 0.0%             | 0.0%                 |
| 24                         | 0                  | 0.0%             | 0.0%                 |
| 25                         | 0                  | 0.0%             | 0.0%                 |
| 26                         | 0                  | 0.0%             | 0.0%                 |
| 27                         | 0                  | 0.0%             | 0.0%                 |
| 28                         | 0                  | 0.0%             | 0.0%                 |
| 29                         | 0                  | 0.0%             | 0.0%                 |
| 30                         | 0                  | 0.0%             | 0.0%                 |
| 31                         | 1                  | 1.0%             | 1.0%                 |
| 32                         | 4                  | 4.0%             | 5.0%                 |
| 33                         | 4                  | 4.0%             | 9.0%                 |
| 34                         | 5                  | 5.0%             | 14.0%                |
| 35                         | 8                  | 8.0%             | 22.0%                |
| 36                         | 8                  | 8.0%             | 30.0%                |
| 37                         | 14                 | 14.0%            | 44.0%                |
| 38                         | 15                 | 15.0%            | 59.0%                |
| 39                         | 10                 | 10.0%            | 69.0%                |
| POSTED SPEED <b>40</b>     | 6                  | 6.0%             | 75.0%                |
| 41                         | 9                  | 9.0%             | 84.0%                |
| 42                         | 7                  | 7.0%             | 91.0%                |
| 43                         | 3                  | 3.0%             | 94.0%                |
| 44                         | 3                  | 3.0%             | 97.0%                |
| 45                         | 3                  | 3.0%             | 100.0%               |
| 46                         | 0                  | 0.0%             | 100.0%               |
| 47                         | 0                  | 0.0%             | 100.0%               |
| 48                         | 0                  | 0.0%             | 100.0%               |
| 49                         | 0                  | 0.0%             | 100.0%               |
| 50                         | 0                  | 0.0%             | 100.0%               |
| 51                         | 0                  | 0.0%             | 100.0%               |
| 52                         | 0                  | 0.0%             | 100.0%               |
| 53                         | 0                  | 0.0%             | 100.0%               |
| 54                         | 0                  | 0.0%             | 100.0%               |
| 55                         | 0                  | 0.0%             | 100.0%               |
| 56                         | 0                  | 0.0%             | 100.0%               |
| 57                         | 0                  | 0.0%             | 100.0%               |
| 58                         | 0                  | 0.0%             | 100.0%               |
| 59                         | 0                  | 0.0%             | 100.0%               |
| 60                         | 0                  | 0.0%             | 100.0%               |
| 61                         | 0                  | 0.0%             | 100.0%               |
| 62                         | 0                  | 0.0%             | 100.0%               |
| 63                         | 0                  | 0.0%             | 100.0%               |
| 64                         | 0                  | 0.0%             | 100.0%               |
| 65                         | 0                  | 0.0%             | 100.0%               |
| 66                         | 0                  | 0.0%             | 100.0%               |
| 67                         | 0                  | 0.0%             | 100.0%               |
| 68                         | 0                  | 0.0%             | 100.0%               |
| 69                         | 0                  | 0.0%             | 100.0%               |
| 70                         | 0                  | 0.0%             | 100.0%               |
| 71                         | 0                  | 0.0%             | 100.0%               |
| 72                         | 0                  | 0.0%             | 100.0%               |
| 73                         | 0                  | 0.0%             | 100.0%               |
| 74                         | 0                  | 0.0%             | 100.0%               |
| 75                         | 0                  | 0.0%             | 100.0%               |
| TOTAL VEHICLES: <b>100</b> |                    |                  |                      |

RECORDER: **JLR**

LOCATION:

**Broadview Ave**

APPROACH:

**NB**

SURFACE:

**Dry**

WEATHER:

**cloudy/breezy**

DATE:

**10/22/14**

TIME:

**11:30 AM - 1:00 PM**

## SURVEY STATISTICS

**POSTED SPEED:** **40** MPH

**AVERAGE SPEED:** **38** MPH

**MEDIAN SPEED:** **37** MPH

**MODAL SPEED:** **38** MPH

**85TH PERCENTILE SPEED:** **41** MPH

**10 MPH PACE:** **33 - 42** MPH

**PERCENT IN PACE:** **86%**

**PERCENT ENFORCEABLE:** **0%**

COMMENTS:

## RADAR SPOT SPEED STUDY FIELD SHEET

LOCATION: Broadview Ave      APPROACH: NB      SURFACE: Dry

DATE: 10/22/14      TIME: 11:30 AM - 1:00 PM      WEATHER: cloudy/breezy      POSTED SPEED: 40      RECORDER: JLR

"X"= PASSENGER CARS

"B"= BUSES

"T"= TRUCKS

MPH

[illegible]

COMMENTS:

100

# VEHICLE SPOT SPEED STUDY

| SPEED RANGES        | NUMBER OF VEHICLES | PERCENT OF TOTAL | PERCENT ACCUMULATION |
|---------------------|--------------------|------------------|----------------------|
| 20                  | 0                  | 0.0%             | 0.0%                 |
| 21                  | 0                  | 0.0%             | 0.0%                 |
| 22                  | 0                  | 0.0%             | 0.0%                 |
| 23                  | 0                  | 0.0%             | 0.0%                 |
| 24                  | 0                  | 0.0%             | 0.0%                 |
| 25                  | 0                  | 0.0%             | 0.0%                 |
| 26                  | 0                  | 0.0%             | 0.0%                 |
| 27                  | 0                  | 0.0%             | 0.0%                 |
| 28                  | 0                  | 0.0%             | 0.0%                 |
| 29                  | 0                  | 0.0%             | 0.0%                 |
| 30                  | 0                  | 0.0%             | 0.0%                 |
| 31                  | 2                  | 2.0%             | 2.0%                 |
| 32                  | 6                  | 6.0%             | 8.0%                 |
| 33                  | 6                  | 6.0%             | 14.0%                |
| 34                  | 11                 | 11.0%            | 25.0%                |
| 35                  | 12                 | 12.0%            | 37.0%                |
| 36                  | 9                  | 9.0%             | 46.0%                |
| 37                  | 17                 | 17.0%            | 63.0%                |
| 38                  | 11                 | 11.0%            | 74.0%                |
| 39                  | 6                  | 6.0%             | 80.0%                |
| 40                  | 9                  | 9.0%             | 89.0%                |
| 41                  | 6                  | 6.0%             | 95.0%                |
| 42                  | 2                  | 2.0%             | 97.0%                |
| 43                  | 2                  | 2.0%             | 99.0%                |
| 44                  | 0                  | 0.0%             | 99.0%                |
| 45                  | 1                  | 1.0%             | 100.0%               |
| 46                  | 0                  | 0.0%             | 100.0%               |
| 47                  | 0                  | 0.0%             | 100.0%               |
| 48                  | 0                  | 0.0%             | 100.0%               |
| 49                  | 0                  | 0.0%             | 100.0%               |
| 50                  | 0                  | 0.0%             | 100.0%               |
| 51                  | 0                  | 0.0%             | 100.0%               |
| 52                  | 0                  | 0.0%             | 100.0%               |
| 53                  | 0                  | 0.0%             | 100.0%               |
| 54                  | 0                  | 0.0%             | 100.0%               |
| 55                  | 0                  | 0.0%             | 100.0%               |
| 56                  | 0                  | 0.0%             | 100.0%               |
| 57                  | 0                  | 0.0%             | 100.0%               |
| 58                  | 0                  | 0.0%             | 100.0%               |
| 59                  | 0                  | 0.0%             | 100.0%               |
| 60                  | 0                  | 0.0%             | 100.0%               |
| 61                  | 0                  | 0.0%             | 100.0%               |
| 62                  | 0                  | 0.0%             | 100.0%               |
| 63                  | 0                  | 0.0%             | 100.0%               |
| 64                  | 0                  | 0.0%             | 100.0%               |
| 65                  | 0                  | 0.0%             | 100.0%               |
| 66                  | 0                  | 0.0%             | 100.0%               |
| 67                  | 0                  | 0.0%             | 100.0%               |
| 68                  | 0                  | 0.0%             | 100.0%               |
| 69                  | 0                  | 0.0%             | 100.0%               |
| 70                  | 0                  | 0.0%             | 100.0%               |
| 71                  | 0                  | 0.0%             | 100.0%               |
| 72                  | 0                  | 0.0%             | 100.0%               |
| 73                  | 0                  | 0.0%             | 100.0%               |
| 74                  | 0                  | 0.0%             | 100.0%               |
| 75                  | 0                  | 0.0%             | 100.0%               |
| TOTAL VEHICLES: 100 |                    |                  |                      |

RECORDER: JLR

LOCATION:

Broadview Ave

APPROACH: SB

SURFACE: Dry

WEATHER: cloudy/breezy

DATE: 10/22/14

TIME: 11:30 AM - 1:00 PM

## SURVEY STATISTICS

POSTED SPEED: 40 MPH

AVERAGE SPEED: 37 MPH

MEDIAN SPEED: 36 MPH

MODAL SPEED: 37 MPH

85TH PERCENTILE SPEED: 39 MPH

10 MPH PACE: 32 - 41 MPH

PERCENT IN PACE: 93%

PERCENT ENFORCEABLE: 0%

COMMENTS:

LOCATION: Broadview Ave      APPROACH: SB      SURFACE: Dry

DATE: 10/22/14      TIME: 11:30 AM - 1:00 PM      WEATHER: cloudy/breezy      POSTED SPEED: 40      RECORDER: JLR

"T"= TRUCKS

COMMENTS: 100

# **APPENDIX I**

## **Traffic Studies – Existing Operational Analyses**

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# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |                                                                                    |  |  |  |                                                                                     |  |
| Volume (vph)                      | 124                                                                               | 61                                                                                | 246                                                                               | 71                                                                                | 87                                                                                | 29                                                                                | 6                                                                                  | 245                                                                                 | 712                                                                                 | 32                                                                                  | 7                                                                                   | 26                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               |                                                                                    | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.97                                                                                | 0.95                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 1.00                                                                                | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     | 0.95                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              |                                                                                    | 3433                                                                                | 3516                                                                                |                                                                                     |                                                                                     | 1770                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.05                                                                                | 1.00                                                                                |                                                                                     |                                                                                     | 0.23                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              |                                                                                    | 199                                                                                 | 3516                                                                                |                                                                                     |                                                                                     | 431                                                                                 |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 135                                                                               | 66                                                                                | 267                                                                               | 77                                                                                | 95                                                                                | 32                                                                                | 7                                                                                  | 266                                                                                 | 774                                                                                 | 35                                                                                  | 8                                                                                   | 28                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 99                                                                                | 102                                                                               | 267                                                                               | 77                                                                                | 95                                                                                | 32                                                                                | 0                                                                                  | 273                                                                                 | 807                                                                                 | 0                                                                                   | 0                                                                                   | 36                                                                                  |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | custom                                                                             | Prot                                                                                | NA                                                                                  |                                                                                     | custom                                                                              | Prot                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   |                                                                                    | 3                                                                                   | 8                                                                                   |                                                                                     |                                                                                     | 7                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | 3                                                                                  |                                                                                     |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |
| Actuated Green, G (s)             | 14.5                                                                              | 14.5                                                                              | 150.0                                                                             | 13.0                                                                              | 13.0                                                                              | 150.0                                                                             |                                                                                    | 72.8                                                                                | 85.2                                                                                |                                                                                     |                                                                                     | 17.3                                                                                |
| Effective Green, g (s)            | 14.5                                                                              | 14.5                                                                              | 150.0                                                                             | 13.0                                                                              | 13.0                                                                              | 150.0                                                                             |                                                                                    | 72.8                                                                                | 85.2                                                                                |                                                                                     |                                                                                     | 17.3                                                                                |
| Actuated g/C Ratio                | 0.10                                                                              | 0.10                                                                              | 1.00                                                                              | 0.09                                                                              | 0.09                                                                              | 1.00                                                                              |                                                                                    | 0.49                                                                                | 0.57                                                                                |                                                                                     |                                                                                     | 0.12                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 162                                                                               | 168                                                                               | 1583                                                                              | 153                                                                               | 161                                                                               | 1583                                                                              |                                                                                    | 96                                                                                  | 1997                                                                                |                                                                                     |                                                                                     | 49                                                                                  |
| v/s Ratio Prot                    | c0.06                                                                             | 0.06                                                                              |                                                                                   | 0.04                                                                              | c0.05                                                                             |                                                                                   |                                                                                    |                                                                                     | 0.23                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                    | c1.37                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.61                                                                              | 0.61                                                                              | 0.17                                                                              | 0.50                                                                              | 0.59                                                                              | 0.02                                                                              |                                                                                    | 2.84                                                                                | 0.40                                                                                |                                                                                     |                                                                                     | 0.73                                                                                |
| Uniform Delay, d1                 | 65.0                                                                              | 65.0                                                                              | 0.0                                                                               | 65.4                                                                              | 65.9                                                                              | 0.0                                                                               |                                                                                    | 38.6                                                                                | 18.2                                                                                |                                                                                     |                                                                                     | 64.1                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.11                                                                                | 1.20                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Incremental Delay, d2             | 6.7                                                                               | 6.1                                                                               | 0.2                                                                               | 2.6                                                                               | 5.7                                                                               | 0.0                                                                               |                                                                                    | 853.2                                                                               | 0.5                                                                                 |                                                                                     |                                                                                     | 43.4                                                                                |
| Delay (s)                         | 71.7                                                                              | 71.1                                                                              | 0.2                                                                               | 68.0                                                                              | 71.6                                                                              | 0.0                                                                               |                                                                                    | 896.1                                                                               | 22.4                                                                                |                                                                                     |                                                                                     | 107.5                                                                               |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 |                                                                                    | F                                                                                   | C                                                                                   |                                                                                     |                                                                                     | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 30.8                                                                              |                                                                                   |                                                                                   | 59.0                                                                              |                                                                                   |                                                                                    |                                                                                     | 242.8                                                                               |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 132.2                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.88                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015



| Movement               | SBT   | SBR   |
|------------------------|-------|-------|
| Lane Configurations    | ↑↑    | ↑     |
| Volume (vph)           | 478   | 204   |
| Ideal Flow (vphpl)     | 1900  | 1900  |
| Total Lost time (s)    | 5.0   | 5.0   |
| Lane Util. Factor      | 0.95  | 1.00  |
| Frt                    | 1.00  | 0.85  |
| Flt Protected          | 1.00  | 1.00  |
| Satd. Flow (prot)      | 3539  | 1583  |
| Flt Permitted          | 1.00  | 1.00  |
| Satd. Flow (perm)      | 3539  | 1583  |
| Peak-hour factor, PHF  | 0.92  | 0.92  |
| Adj. Flow (vph)        | 520   | 222   |
| RTOR Reduction (vph)   | 0     | 157   |
| Lane Group Flow (vph)  | 520   | 65    |
| Turn Type              | NA    | pm+ov |
| Protected Phases       | 4     | 6     |
| Permitted Phases       |       | 4     |
| Actuated Green, G (s)  | 29.7  | 44.2  |
| Effective Green, g (s) | 29.7  | 44.2  |
| Actuated g/C Ratio     | 0.20  | 0.29  |
| Clearance Time (s)     | 5.0   | 5.0   |
| Vehicle Extension (s)  | 3.0   | 3.0   |
| Lane Grp Cap (vph)     | 700   | 466   |
| v/s Ratio Prot         | c0.15 | 0.01  |
| v/s Ratio Perm         |       | 0.03  |
| v/c Ratio              | 0.74  | 0.14  |
| Uniform Delay, d1      | 56.6  | 38.9  |
| Progression Factor     | 1.00  | 1.00  |
| Incremental Delay, d2  | 7.0   | 0.1   |
| Delay (s)              | 63.6  | 39.1  |
| Level of Service       | E     | D     |
| Approach Delay (s)     | 58.6  |       |
| Approach LOS           | E     |       |
| Intersection Summary   |       |       |



# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Volume (veh/h)                    | 5                                                                                 | 2                                                                                 | 87                                                                                | 7                                                                                 | 1                                                                                 | 16                                                                                | 10                                                                                 | 141                                                                                 | 925                                                                                 | 11                                                                                  | 25                                                                                  | 704                                                                                 |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 5                                                                                 | 2                                                                                 | 95                                                                                | 8                                                                                 | 1                                                                                 | 17                                                                                | 0                                                                                  | 153                                                                                 | 1005                                                                                | 12                                                                                  | 27                                                                                  | 765                                                                                 |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              |                                                                                   | 0.00                                                                               | 0.87                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1661                                                                              | 2158                                                                              | 397                                                                               | 1851                                                                              | 2166                                                                              | 509                                                                               | 0                                                                                  | 793                                                                                 |                                                                                     |                                                                                     | 1017                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1461                                                                              | 2032                                                                              | 8                                                                                 | 1679                                                                              | 2041                                                                              | 509                                                                               | 0                                                                                  | 464                                                                                 |                                                                                     |                                                                                     | 1017                                                                                |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                                | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                                | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 91                                                                                | 95                                                                                | 90                                                                                | 81                                                                                | 97                                                                                | 97                                                                                | 0                                                                                  | 84                                                                                  |                                                                                     |                                                                                     | 96                                                                                  |                                                                                     |
| cM capacity (veh/h)               | 63                                                                                | 40                                                                                | 933                                                                               | 39                                                                                | 39                                                                                | 510                                                                               | 0                                                                                  | 952                                                                                 |                                                                                     |                                                                                     | 678                                                                                 |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                               | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 102                                                                               | 26                                                                                | 153                                                                               | 670                                                                               | 347                                                                               | 27                                                                                | 510                                                                                | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 5                                                                                 | 8                                                                                 | 153                                                                               | 0                                                                                 | 0                                                                                 | 27                                                                                | 0                                                                                  | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 95                                                                                | 17                                                                                | 0                                                                                 | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                  | 28                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 421                                                                               | 102                                                                               | 952                                                                               | 1700                                                                              | 1700                                                                              | 678                                                                               | 1700                                                                               | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.24                                                                              | 0.25                                                                              | 0.16                                                                              | 0.39                                                                              | 0.20                                                                              | 0.04                                                                              | 0.30                                                                               | 0.17                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 23                                                                                | 23                                                                                | 14                                                                                | 0                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                  | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 16.3                                                                              | 51.8                                                                              | 9.5                                                                               | 0.0                                                                               | 0.0                                                                               | 10.5                                                                              | 0.0                                                                                | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | C                                                                                 | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 16.3                                                                              | 51.8                                                                              | 1.2                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | C                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 45.2%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015

|                        |      |
|------------------------|------|
| Movement               | SBR  |
| Lane Configurations    |      |
| Volume (veh/h)         | 26   |
| Sign Control           |      |
| Grade                  |      |
| Peak Hour Factor       | 0.92 |
| Hourly flow rate (vph) | 28   |
| Pedestrians            |      |
| Lane Width (ft)        |      |
| Walking Speed (ft/s)   |      |
| Percent Blockage       |      |
| Right turn flare (veh) |      |
| Median type            |      |
| Median storage veh)    |      |
| Upstream signal (ft)   |      |
| pX, platoon unblocked  |      |
| vC, conflicting volume |      |
| vC1, stage 1 conf vol  |      |
| vC2, stage 2 conf vol  |      |
| vCu, unblocked vol     |      |
| tC, single (s)         |      |
| tC, 2 stage (s)        |      |
| tF (s)                 |      |
| p0 queue free %        |      |
| cM capacity (veh/h)    |      |
| Direction, Lane #      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Broadview Ave & Shopping Center/Chappell St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|--|--|--|--|--|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |  |  |  |  |  |  |
| Lane Configurations               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |  |  |  |  |  |  |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 6                                                                                 | 1                                                                                  | 0                                                                                   | 1171                                                                                | 6                                                                                   | 4                                                                                   | 830                                                                                 |  |  |  |  |  |  |
| Sign Control                      | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Free                                                                               |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                 |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |  |  |  |  |  |  |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                  | 0                                                                                   | 1273                                                                                | 7                                                                                   | 4                                                                                   | 902                                                                                 |  |  |  |  |  |  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | None                                                                               |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.00                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| vC, conflicting volume            | 1554                                                                              | 2190                                                                              | 451                                                                               | 1736                                                                              | 2187                                                                              | 640                                                                               | 0                                                                                  | 902                                                                                 |                                                                                     |                                                                                     |                                                                                     | 1279                                                                                |  |  |  |  |  |  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| vCu, unblocked vol                | 1554                                                                              | 2190                                                                              | 451                                                                               | 1736                                                                              | 2187                                                                              | 640                                                                               | 0                                                                                  | 902                                                                                 |                                                                                     |                                                                                     |                                                                                     | 1279                                                                                |  |  |  |  |  |  |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                                | 4.1                                                                                 |                                                                                     |                                                                                     |                                                                                     | 4.1                                                                                 |  |  |  |  |  |  |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                                | 2.2                                                                                 |                                                                                     |                                                                                     |                                                                                     | 2.2                                                                                 |  |  |  |  |  |  |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 100                                                                               | 96                                                                                | 100                                                                               | 98                                                                                | 0                                                                                  | 100                                                                                 |                                                                                     |                                                                                     |                                                                                     | 99                                                                                  |  |  |  |  |  |  |
| cM capacity (veh/h)               | 75                                                                                | 44                                                                                | 556                                                                               | 56                                                                                | 45                                                                                | 418                                                                               | 0                                                                                  | 749                                                                                 |                                                                                     |                                                                                     |                                                                                     | 538                                                                                 |  |  |  |  |  |  |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Volume Total                      | 9                                                                                 | 0                                                                                 | 849                                                                               | 431                                                                               | 4                                                                                 | 451                                                                               | 451                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Volume Right                      | 7                                                                                 | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| cSH                               | 159                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 538                                                                               | 1700                                                                              | 1700                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Volume to Capacity                | 0.05                                                                              | 0.00                                                                              | 0.50                                                                              | 0.25                                                                              | 0.01                                                                              | 0.27                                                                              | 0.27                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Queue Length 95th (ft)            | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Control Delay (s)                 | 28.9                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 11.7                                                                              | 0.0                                                                               | 0.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Lane LOS                          | D                                                                                 |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Approach Delay (s)                | 28.9                                                                              | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Approach LOS                      | D                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Average Delay                     |                                                                                   |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 42.6%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |

# HCM Unsignalized Intersection Capacity Analysis 9: Broadview Ave & Shopping Center/Chappell St

2/17/2015



| Movement               | SBR  |
|------------------------|------|
| Lane Configurations    |      |
| Volume (veh/h)         | 0    |
| Sign Control           |      |
| Grade                  |      |
| Peak Hour Factor       | 0.92 |
| Hourly flow rate (vph) | 0    |
| Pedestrians            |      |
| Lane Width (ft)        |      |
| Walking Speed (ft/s)   |      |
| Percent Blockage       |      |
| Right turn flare (veh) |      |
| Median type            |      |
| Median storage veh     |      |
| Upstream signal (ft)   |      |
| pX, platoon unblocked  |      |
| vC, conflicting volume |      |
| vC1, stage 1 conf vol  |      |
| vC2, stage 2 conf vol  |      |
| vCu, unblocked vol     |      |
| tC, single (s)         |      |
| tC, 2 stage (s)        |      |
| tF (s)                 |      |
| p0 queue free %        |      |
| cM capacity (veh/h)    |      |
| Direction, Lane #      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Broadview Ave & Stuyvesant St

2/17/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 7                                                                                 | 3                                                                                 | 1214                                                                              | 18                                                                                | 8                                                                                 | 807                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 8                                                                                 | 3                                                                                 | 1320                                                                              | 20                                                                                | 9                                                                                 | 877                                                                               |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 1785                                                                              | 670                                                                               |                                                                                   |                                                                                   | 1339                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1785                                                                              | 670                                                                               |                                                                                   |                                                                                   | 1339                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 89                                                                                | 99                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 72                                                                                | 400                                                                               |                                                                                   |                                                                                   | 511                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 880                                                                               | 459                                                                               | 9                                                                                 | 439                                                                               | 439                                                                               |
| Volume Left                       | 8                                                                                 | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 3                                                                                 | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 95                                                                                | 1700                                                                              | 1700                                                                              | 511                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.11                                                                              | 0.52                                                                              | 0.27                                                                              | 0.02                                                                              | 0.26                                                                              | 0.26                                                                              |
| Queue Length 95th (ft)            | 9                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 47.8                                                                              | 0.0                                                                               | 0.0                                                                               | 12.2                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 47.8                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 44.1%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 27                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 13                                                                                  | 1187                                                                                | 0                                                                                   | 0                                                                                   | 814                                                                                 | 13                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 29                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 14                                                                                  | 1290                                                                                | 0                                                                                   | 0                                                                                   | 885                                                                                 | 14                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1565                                                                              | 2210                                                                              | 449                                                                               | 1787                                                                              | 2217                                                                              | 645                                                                               | 899                                                                                 |                                                                                     |                                                                                     | 1290                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1565                                                                              | 2210                                                                              | 449                                                                               | 1787                                                                              | 2217                                                                              | 645                                                                               | 899                                                                                 |                                                                                     |                                                                                     | 1290                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 60                                                                                | 100                                                                               | 95                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 98                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 74                                                                                | 43                                                                                | 557                                                                               | 48                                                                                | 42                                                                                | 415                                                                               | 751                                                                                 |                                                                                     |                                                                                     | 533                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 55                                                                                | 0                                                                                 | 14                                                                                | 860                                                                               | 430                                                                               | 0                                                                                 | 590                                                                                 | 309                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 29                                                                                | 0                                                                                 | 14                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 14                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 125                                                                               | 1700                                                                              | 751                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.44                                                                              | 0.00                                                                              | 0.02                                                                              | 0.51                                                                              | 0.25                                                                              | 0.00                                                                              | 0.35                                                                                | 0.18                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 49                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 54.7                                                                              | 0.0                                                                               | 9.9                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 54.7                                                                              | 0.0                                                                               | 0.1                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 1.4                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 42.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/17/2015

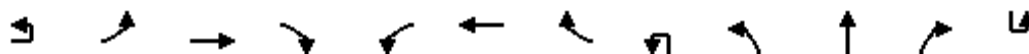


| Movement                          | WBL  | WBR  | NBT   | NBR  | SBL                  | SBT  |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations               | W    | R    | T     | R    | L                    | R    |
| Volume (veh/h)                    | 4    | 66   | 1138  | 11   | 30                   | 801  |
| Sign Control                      | Stop |      | Free  |      |                      | Free |
| Grade                             | 0%   |      | 0%    |      |                      | 0%   |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 4    | 72   | 1237  | 12   | 33                   | 871  |
| Pedestrians                       |      |      |       |      |                      |      |
| Lane Width (ft)                   |      |      |       |      |                      |      |
| Walking Speed (ft/s)              |      |      |       |      |                      |      |
| Percent Blockage                  |      |      |       |      |                      |      |
| Right turn flare (veh)            |      |      |       |      |                      |      |
| Median type                       |      |      | None  |      | None                 |      |
| Median storage (veh)              |      |      |       |      |                      |      |
| Upstream signal (ft)              |      |      | 976   |      |                      |      |
| pX, platoon unblocked             | 0.90 | 0.90 |       |      | 0.90                 |      |
| vC, conflicting volume            | 1743 | 624  |       |      | 1249                 |      |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 1610 | 372  |       |      | 1063                 |      |
| tC, single (s)                    | 6.8  | 6.9  |       |      | 4.1                  |      |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 3.5  | 3.3  |       |      | 2.2                  |      |
| p0 queue free %                   | 95   | 87   |       |      | 94                   |      |
| cM capacity (veh/h)               | 81   | 565  |       |      | 589                  |      |
| Direction, Lane #                 | WB 1 | NB 1 | NB 2  | SB 1 | SB 2                 | SB 3 |
| Volume Total                      | 76   | 825  | 424   | 33   | 435                  | 435  |
| Volume Left                       | 4    | 0    | 0     | 33   | 0                    | 0    |
| Volume Right                      | 72   | 0    | 12    | 0    | 0                    | 0    |
| cSH                               | 422  | 1700 | 1700  | 589  | 1700                 | 1700 |
| Volume to Capacity                | 0.18 | 0.49 | 0.25  | 0.06 | 0.26                 | 0.26 |
| Queue Length 95th (ft)            | 16   | 0    | 0     | 4    | 0                    | 0    |
| Control Delay (s)                 | 15.4 | 0.0  | 0.0   | 11.5 | 0.0                  | 0.0  |
| Lane LOS                          | C    |      |       | B    |                      |      |
| Approach Delay (s)                | 15.4 | 0.0  |       | 0.4  |                      |      |
| Approach LOS                      | C    |      |       |      |                      |      |
| Intersection Summary              |      |      |       |      |                      |      |
| Average Delay                     |      |      | 0.7   |      |                      |      |
| Intersection Capacity Utilization |      |      | 42.8% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015



| Movement               | EBU  | EBL   | EBT  | EBR  | WBL   | WBT   | WBR  | NBU    | NBL    | NBT   | NBR  | SBU    |
|------------------------|------|-------|------|------|-------|-------|------|--------|--------|-------|------|--------|
| Lane Configurations    |      | ↔     | ↔    | ↔    |       | ↔     | ↔    |        | ↔      | ↔     | ↔    |        |
| Volume (vph)           | 1    | 713   | 177  | 180  | 30    | 99    | 86   | 1      | 173    | 352   | 27   | 1      |
| Ideal Flow (vphpl)     | 1900 | 1900  | 1900 | 1900 | 1900  | 1900  | 1900 | 1900   | 1900   | 1900  | 1900 | 1900   |
| Total Lost time (s)    |      | 4.0   | 4.0  | 4.0  |       | 4.0   | 4.0  |        | 4.0    | 4.0   | 4.0  |        |
| Lane Util. Factor      |      | 0.95  | 0.95 | 1.00 |       | 0.95  | 1.00 |        | 1.00   | 0.95  | 1.00 |        |
| Flt Protected          |      | 1.00  | 1.00 | 0.85 |       | 1.00  | 0.85 |        | 1.00   | 1.00  | 0.85 |        |
| Flt Permitted          |      | 0.95  | 0.97 | 1.00 |       | 0.99  | 1.00 |        | 0.95   | 1.00  | 1.00 |        |
| Satd. Flow (prot)      |      | 1681  | 1717 | 1583 |       | 3498  | 1583 |        | 1770   | 3539  | 1583 |        |
| Satd. Flow (perm)      |      | 1172  | 1717 | 1583 |       | 3498  | 1583 |        | 438    | 3539  | 1583 |        |
| Peak-hour factor, PHF  | 0.92 | 0.92  | 0.92 | 0.92 | 0.92  | 0.92  | 0.92 | 0.92   | 0.92   | 0.92  | 0.92 | 0.92   |
| Adj. Flow (vph)        | 1    | 775   | 192  | 196  | 33    | 108   | 93   | 1      | 188    | 383   | 29   | 1      |
| RTOR Reduction (vph)   | 0    | 0     | 0    | 119  | 0     | 0     | 81   | 0      | 0      | 0     | 25   | 0      |
| Lane Group Flow (vph)  | 0    | 466   | 502  | 77   | 0     | 141   | 12   | 0      | 189    | 383   | 4    | 0      |
| Turn Type              | Perm | Split | NA   | Perm | Split | NA    | Perm | custom | Prot   | NA    | Perm | custom |
| Protected Phases       |      | 6     | 6    |      | 2     | 2     |      |        | 3      | 8     |      |        |
| Permitted Phases       | 6    |       |      | 6    |       |       | 2    | 3      |        |       | 8    | 7      |
| Actuated Green, G (s)  |      | 59.3  | 59.3 | 59.3 |       | 20.0  | 20.0 |        | 17.0   | 22.7  | 22.7 |        |
| Effective Green, g (s) |      | 59.3  | 59.3 | 59.3 |       | 20.0  | 20.0 |        | 17.0   | 22.7  | 22.7 |        |
| Actuated g/C Ratio     |      | 0.40  | 0.40 | 0.40 |       | 0.13  | 0.13 |        | 0.11   | 0.15  | 0.15 |        |
| Clearance Time (s)     |      | 4.0   | 4.0  | 4.0  |       | 4.0   | 4.0  |        | 4.0    | 4.0   | 4.0  |        |
| Vehicle Extension (s)  |      | 3.0   | 3.0  | 3.0  |       | 3.0   | 3.0  |        | 3.0    | 3.0   | 3.0  |        |
| Lane Grp Cap (vph)     |      | 463   | 678  | 625  |       | 466   | 211  |        | 49     | 535   | 239  |        |
| v/s Ratio Prot         |      |       | 0.29 |      |       | c0.04 |      |        |        | c0.11 |      |        |
| v/s Ratio Perm         |      | c0.40 |      | 0.05 |       |       | 0.01 |        | c0.43  |       | 0.00 |        |
| v/c Ratio              |      | 1.01  | 0.74 | 0.12 |       | 0.30  | 0.06 |        | 3.86   | 0.72  | 0.02 |        |
| Uniform Delay, d1      |      | 45.4  | 38.8 | 28.8 |       | 58.7  | 56.8 |        | 66.5   | 60.6  | 54.2 |        |
| Progression Factor     |      | 1.00  | 1.00 | 1.00 |       | 1.00  | 1.00 |        | 1.00   | 1.00  | 1.00 |        |
| Incremental Delay, d2  |      | 43.4  | 4.4  | 0.1  |       | 0.4   | 0.1  |        | 1333.5 | 8.0   | 0.1  |        |
| Delay (s)              |      | 88.8  | 43.1 | 28.9 |       | 59.1  | 56.9 |        | 1400.0 | 68.6  | 54.3 |        |
| Level of Service       |      | F     | D    | C    |       | E     | E    |        | F      | E     | D    |        |
| Approach Delay (s)     |      |       | 59.0 |      |       | 58.2  |      |        |        | 486.6 |      |        |
| Approach LOS           |      |       | E    |      |       | E     |      |        |        | F     |      |        |

### Intersection Summary

|                                   |       |                           |      |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay            | 200.5 | HCM 2000 Level of Service | F    |
| HCM 2000 Volume to Capacity ratio | 1.27  |                           |      |
| Actuated Cycle Length (s)         | 150.0 | Sum of lost time (s)      | 16.0 |
| Intersection Capacity Utilization | 77.8% | ICU Level of Service      | D    |
| Analysis Period (min)             | 15    |                           |      |
| c Critical Lane Group             |       |                           |      |



# SimTraffic Simulation Summary

## AM Existing

2/17/2015

### Summary of All Intervals

| Run Number              | 24   | 25   | 26   | 27   | 28   |      | Avg  |
|-------------------------|------|------|------|------|------|------|------|
| Start Time              | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 |
| End Time                | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 |
| Total Time (min)        | 13   | 13   | 13   | 13   | 13   | 13   | 13   |
| Time Recorded (min)     | 10   | 10   | 10   | 10   | 10   | 10   | 10   |
| # of Intervals          | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| # of Recorded Intervals | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| Vehs Entered            | 581  | 540  | 579  | 591  | 579  | 584  | 575  |
| Vehs Exited             | 569  | 554  | 586  | 572  | 551  | 584  | 570  |
| Starting Vehs           | 109  | 131  | 125  | 105  | 113  | 136  | 116  |
| Ending Vehs             | 121  | 117  | 118  | 124  | 141  | 136  | 124  |
| Travel Distance (mi)    | 457  | 411  | 455  | 431  | 434  | 452  | 440  |
| Travel Time (hr)        | 21.7 | 19.7 | 22.7 | 20.9 | 20.8 | 22.2 | 21.4 |
| Total Delay (hr)        | 8.9  | 8.1  | 10.0 | 8.8  | 8.6  | 9.6  | 9.0  |
| Total Stops             | 545  | 494  | 576  | 531  | 492  | 598  | 537  |
| Fuel Used (gal)         | 18.0 | 16.4 | 18.4 | 17.2 | 17.1 | 18.4 | 17.6 |

### Interval #0 Information Seeding

|                                     |      |
|-------------------------------------|------|
| Start Time                          | 6:57 |
| End Time                            | 7:00 |
| Total Time (min)                    | 3    |
| Volumes adjusted by Growth Factors. |      |
| No data recorded this interval.     |      |

### Interval #1 Information Recording

|                                     |      |
|-------------------------------------|------|
| Start Time                          | 7:00 |
| End Time                            | 7:10 |
| Total Time (min)                    | 10   |
| Volumes adjusted by Growth Factors. |      |

| Run Number           | 24   | 25   | 26   | 27   | 28   |      | Avg  |
|----------------------|------|------|------|------|------|------|------|
| Vehs Entered         | 581  | 540  | 579  | 591  | 579  | 584  | 575  |
| Vehs Exited          | 569  | 554  | 586  | 572  | 551  | 584  | 570  |
| Starting Vehs        | 109  | 131  | 125  | 105  | 113  | 136  | 116  |
| Ending Vehs          | 121  | 117  | 118  | 124  | 141  | 136  | 124  |
| Travel Distance (mi) | 457  | 411  | 455  | 431  | 434  | 452  | 440  |
| Travel Time (hr)     | 21.7 | 19.7 | 22.7 | 20.9 | 20.8 | 22.2 | 21.4 |
| Total Delay (hr)     | 8.9  | 8.1  | 10.0 | 8.8  | 8.6  | 9.6  | 9.0  |
| Total Stops          | 545  | 494  | 576  | 531  | 492  | 598  | 537  |
| Fuel Used (gal)      | 18.0 | 16.4 | 18.4 | 17.2 | 17.1 | 18.4 | 17.6 |

Queuing and Blocking Report  
AM Existing

2/17/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | UL  | L   | T   | TR  | UL  | T   |
| Maximum Queue (ft)    | 98  | 173 | 54  | 93  | 143 | 38 | 121 | 150 | 226 | 244 | 53  | 162 |
| Average Queue (ft)    | 41  | 129 | 11  | 56  | 81  | 11 | 94  | 115 | 141 | 165 | 36  | 102 |
| 95th Queue (ft)       | 126 | 191 | 52  | 104 | 160 | 53 | 135 | 167 | 247 | 273 | 71  | 175 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  |     |     |     |     | 35  | 0  |     |     | 0   |     |     | 3   |
| Queuing Penalty (veh) |     |     |     |     | 10  | 0  |     |     | 1   |     |     | 1   |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 134 | 70  |
| Average Queue (ft)    | 79  | 37  |
| 95th Queue (ft)       | 155 | 79  |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 0   |     |
| Queuing Penalty (veh) | 0   |     |

Intersection: 6: Broadview Ave & Old Broadview Ave/Roebling St

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LTR | LTR | UL  | L   | TR  |
| Maximum Queue (ft)    | 59  | 28  | 80  | 24  | 4   |
| Average Queue (ft)    | 35  | 17  | 44  | 11  | 1   |
| 95th Queue (ft)       | 58  | 38  | 84  | 33  | 7   |
| Link Distance (ft)    | 329 | 466 |     |     | 555 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 210 | 200 |     |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

Queuing and Blocking Report  
AM Existing

2/17/2015

Intersection: 9: Broadview Ave & Shopping Center/Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LTR | L   |
| Maximum Queue (ft)    | 21  | 9   |
| Average Queue (ft)    | 5   | 2   |
| 95th Queue (ft)       | 22  | 13  |
| Link Distance (ft)    | 477 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Broadview Ave & Stuyvesant St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 20  | 24  |
| Average Queue (ft)    | 8   | 8   |
| 95th Queue (ft)       | 27  | 28  |
| Link Distance (ft)    | 293 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 400 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  |
|-----------------------|-----|-----|
| Directions Served     | LTR | L   |
| Maximum Queue (ft)    | 60  | 15  |
| Average Queue (ft)    | 30  | 4   |
| 95th Queue (ft)       | 64  | 19  |
| Link Distance (ft)    | 266 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 300 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

## Queuing and Blocking Report

### AM Existing

2/17/2015

#### Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | SB |
|-----------------------|-----|----|
| Directions Served     | LR  | UL |
| Maximum Queue (ft)    | 52  | 34 |
| Average Queue (ft)    | 37  | 16 |
| 95th Queue (ft)       | 61  | 43 |
| Link Distance (ft)    | 511 |    |
| Upstream Blk Time (%) |     |    |
| Queuing Penalty (veh) |     |    |
| Storage Bay Dist (ft) | 400 |    |
| Storage Blk Time (%)  |     |    |
| Queuing Penalty (veh) |     |    |

#### Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|
| Directions Served     | UL  | LT  | LT  | T   | R   | UL  | T    | T    | R   | UL  | T   | T   |
| Maximum Queue (ft)    | 343 | 404 | 143 | 62  | 50  | 236 | 193  | 200  | 34  | 106 | 123 | 131 |
| Average Queue (ft)    | 287 | 319 | 83  | 17  | 15  | 166 | 113  | 120  | 7   | 77  | 87  | 98  |
| 95th Queue (ft)       | 362 | 441 | 151 | 75  | 66  | 259 | 200  | 212  | 67  | 134 | 144 | 145 |
| Link Distance (ft)    | 794 | 794 | 476 | 476 | 476 |     | 1210 | 1210 |     |     | 896 | 896 |
| Upstream Blk Time (%) |     |     |     |     |     |     |      |      |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |      |      |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     |     |     | 581 |      |      | 180 | 400 |     |     |
| Storage Blk Time (%)  |     |     |     |     |     |     |      | 3    |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |      | 1    |     |     |     |     |

#### Network Summary

Network wide Queuing Penalty: 13

# Lanes, Volumes, Timings

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                            |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group                 | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations        |  |  |  |  |  |  |  |  |  |                                                                                     |  |  |
| Volume (vph)               | 252                                                                               | 71                                                                                | 285                                                                               | 104                                                                               | 137                                                                               | 33                                                                                | 299                                                                                 | 1240                                                                                | 28                                                                                  | 8                                                                                   | 59                                                                                  | 1118                                                                                |
| Ideal Flow (vphpl)         | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)        | 200                                                                               |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 55                                                                                | 300                                                                                 |                                                                                     | 0                                                                                   |                                                                                     | 140                                                                                 |                                                                                     |
| Storage Lanes              | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 2                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |
| Taper Length (ft)          | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |
| Lane Util. Factor          | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 1.00                                                                                | 0.95                                                                                |
| Fr <sub>t</sub>            |                                                                                   |                                                                                   | 0.850                                                                             |                                                                                   |                                                                                   | 0.850                                                                             |                                                                                     | 0.997                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected              | 0.950                                                                             | 0.972                                                                             |                                                                                   | 0.950                                                                             |                                                                                   |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |
| Satd. Flow (prot)          | 1681                                                                              | 1720                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3529                                                                                | 0                                                                                   | 0                                                                                   | 1770                                                                                | 3539                                                                                |
| Flt Permitted              | 0.950                                                                             | 0.972                                                                             |                                                                                   | 0.950                                                                             |                                                                                   |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.120                                                                               |                                                                                     |
| Satd. Flow (perm)          | 1681                                                                              | 1720                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3529                                                                                | 0                                                                                   | 0                                                                                   | 224                                                                                 | 3539                                                                                |
| Right Turn on Red          |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)          |                                                                                   |                                                                                   | 310                                                                               |                                                                                   |                                                                                   | 150                                                                               |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)           |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     |                                                                                     | 40                                                                                  |
| Link Distance (ft)         |                                                                                   | 693                                                                               |                                                                                   |                                                                                   | 663                                                                               |                                                                                   |                                                                                     | 618                                                                                 |                                                                                     |                                                                                     |                                                                                     | 667                                                                                 |
| Travel Time (s)            |                                                                                   | 15.8                                                                              |                                                                                   |                                                                                   | 15.1                                                                              |                                                                                   |                                                                                     | 10.5                                                                                |                                                                                     |                                                                                     |                                                                                     | 11.4                                                                                |
| Peak Hour Factor           | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)            | 274                                                                               | 77                                                                                | 310                                                                               | 113                                                                               | 149                                                                               | 36                                                                                | 325                                                                                 | 1348                                                                                | 30                                                                                  | 9                                                                                   | 64                                                                                  | 1215                                                                                |
| Shared Lane Traffic (%)    | 37%                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)      | 173                                                                               | 178                                                                               | 310                                                                               | 113                                                                               | 149                                                                               | 36                                                                                | 325                                                                                 | 1378                                                                                | 0                                                                                   | 0                                                                                   | 73                                                                                  | 1215                                                                                |
| Enter Blocked Intersection | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  |
| Lane Alignment             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                                | Left                                                                                | Right                                                                               | R NA                                                                                | Left                                                                                | Left                                                                                |
| Median Width(ft)           |                                                                                   | 12                                                                                |                                                                                   |                                                                                   | 12                                                                                |                                                                                   |                                                                                     | 24                                                                                  |                                                                                     |                                                                                     |                                                                                     | 24                                                                                  |
| Link Offset(ft)            |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     | 0                                                                                   |
| Crosswalk Width(ft)        |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |                                                                                   |                                                                                     | 16                                                                                  |                                                                                     |                                                                                     |                                                                                     | 16                                                                                  |
| Two way Left Turn Lane     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Headway Factor             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Turning Speed (mph)        | 15                                                                                |                                                                                   | 15                                                                                | 15                                                                                |                                                                                   | 15                                                                                | 15                                                                                  |                                                                                     | 9                                                                                   | 9                                                                                   | 15                                                                                  |                                                                                     |
| Number of Detectors        | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                   | 2                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   | 2                                                                                   |
| Detector Template          | Left                                                                              | Thru                                                                              | Right                                                                             | Left                                                                              | Thru                                                                              | Right                                                                             | Left                                                                                | Thru                                                                                |                                                                                     | Left                                                                                | Left                                                                                | Thru                                                                                |
| Leading Detector (ft)      | 20                                                                                | 100                                                                               | 20                                                                                | 20                                                                                | 100                                                                               | 20                                                                                | 20                                                                                  | 100                                                                                 |                                                                                     | 20                                                                                  | 20                                                                                  | 100                                                                                 |
| Trailing Detector (ft)     | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Detector 1 Position(ft)    | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Detector 1 Size(ft)        | 20                                                                                | 6                                                                                 | 20                                                                                | 20                                                                                | 6                                                                                 | 20                                                                                | 20                                                                                  | 6                                                                                   |                                                                                     | 20                                                                                  | 20                                                                                  | 6                                                                                   |
| Detector 1 Type            | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                               | Cl+Ex                                                                               |                                                                                     | Cl+Ex                                                                               | Cl+Ex                                                                               | Cl+Ex                                                                               |
| Detector 1 Channel         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector 1 Extend (s)      | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 1 Queue (s)       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 1 Delay (s)       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 2 Position(ft)    |                                                                                   | 94                                                                                |                                                                                   |                                                                                   | 94                                                                                |                                                                                   |                                                                                     | 94                                                                                  |                                                                                     |                                                                                     |                                                                                     | 94                                                                                  |
| Detector 2 Size(ft)        |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |                                                                                     | 6                                                                                   |
| Detector 2 Type            |                                                                                   | Cl+Ex                                                                             |                                                                                   |                                                                                   | Cl+Ex                                                                             |                                                                                   |                                                                                     | Cl+Ex                                                                               |                                                                                     |                                                                                     |                                                                                     | Cl+Ex                                                                               |
| Detector 2 Channel         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector 2 Extend (s)      |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     | 0.0                                                                                 |
| Turn Type                  | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                                | NA                                                                                  |                                                                                     | custom                                                                              | Prot                                                                                | NA                                                                                  |
| Protected Phases           | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     |                                                                                     | 7                                                                                   | 4                                                                                   |
| Permitted Phases           |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                     |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |                                                                                     |
| Detector Phase             | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 7                                                                                   | 4                                                                                   |

# Lanes, Volumes, Timings

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                            |       |
|----------------------------|-------|
| Lane Group                 | SBR   |
| Lane Configurations        |       |
| Volume (vph)               | 111   |
| Ideal Flow (vphpl)         | 1900  |
| Storage Length (ft)        | 195   |
| Storage Lanes              | 1     |
| Taper Length (ft)          |       |
| Lane Util. Factor          | 1.00  |
| Frt                        | 0.850 |
| Flt Protected              |       |
| Satd. Flow (prot)          | 1583  |
| Flt Permitted              |       |
| Satd. Flow (perm)          | 1583  |
| Right Turn on Red          | Yes   |
| Satd. Flow (RTOR)          | 82    |
| Link Speed (mph)           |       |
| Link Distance (ft)         |       |
| Travel Time (s)            |       |
| Peak Hour Factor           | 0.92  |
| Adj. Flow (vph)            | 121   |
| Shared Lane Traffic (%)    |       |
| Lane Group Flow (vph)      | 121   |
| Enter Blocked Intersection | No    |
| Lane Alignment             | Right |
| Median Width(ft)           |       |
| Link Offset(ft)            |       |
| Crosswalk Width(ft)        |       |
| Two way Left Turn Lane     |       |
| Headway Factor             | 1.00  |
| Turning Speed (mph)        | 9     |
| Number of Detectors        | 1     |
| Detector Template          | Right |
| Leading Detector (ft)      | 20    |
| Trailing Detector (ft)     | 0     |
| Detector 1 Position(ft)    | 0     |
| Detector 1 Size(ft)        | 20    |
| Detector 1 Type            | Cl+Ex |
| Detector 1 Channel         |       |
| Detector 1 Extend (s)      | 0.0   |
| Detector 1 Queue (s)       | 0.0   |
| Detector 1 Delay (s)       | 0.0   |
| Detector 2 Position(ft)    |       |
| Detector 2 Size(ft)        |       |
| Detector 2 Type            |       |
| Detector 2 Channel         |       |
| Detector 2 Extend (s)      |       |
| Turn Type                  | pm+ov |
| Protected Phases           | 6     |
| Permitted Phases           | 4     |
| Detector Phase             | 6     |

# Lanes, Volumes, Timings

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                       |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group            | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Switch Phase          |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                                | 20.0                                                                                |                                                                                     | 8.0                                                                                 | 8.0                                                                                 | 20.0                                                                                |
| Minimum Split (s)     | 13.0                                                                              | 13.0                                                                              |                                                                                   | 13.0                                                                              | 13.0                                                                              |                                                                                   | 13.0                                                                               | 25.0                                                                                |                                                                                     | 13.0                                                                                | 13.0                                                                                | 25.0                                                                                |
| Total Split (s)       | 28.0                                                                              | 28.0                                                                              |                                                                                   | 31.0                                                                              | 31.0                                                                              |                                                                                   | 37.0                                                                               | 78.0                                                                                |                                                                                     | 23.0                                                                                | 23.0                                                                                | 64.0                                                                                |
| Total Split (%)       | 17.5%                                                                             | 17.5%                                                                             |                                                                                   | 19.4%                                                                             | 19.4%                                                                             |                                                                                   | 23.1%                                                                              | 48.8%                                                                               |                                                                                     | 14.4%                                                                               | 14.4%                                                                               | 40.0%                                                                               |
| Maximum Green (s)     | 23.0                                                                              | 23.0                                                                              |                                                                                   | 26.0                                                                              | 26.0                                                                              |                                                                                   | 32.0                                                                               | 73.0                                                                                |                                                                                     | 18.0                                                                                | 18.0                                                                                | 59.0                                                                                |
| Yellow Time (s)       | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                                | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| All-Red Time (s)      | 1.0                                                                               | 1.0                                                                               |                                                                                   | 1.0                                                                               | 1.0                                                                               |                                                                                   | 1.0                                                                                | 1.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 |
| Lost Time Adjust (s)  | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                                | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |
| Total Lost Time (s)   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |
| Lead/Lag              | Lag                                                                               | Lag                                                                               |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                               | Lag                                                                                 |                                                                                     | Lead                                                                                | Lead                                                                                | Lag                                                                                 |
| Lead-Lag Optimize?    | Yes                                                                               | Yes                                                                               |                                                                                   | Yes                                                                               | Yes                                                                               |                                                                                   | Yes                                                                                | Yes                                                                                 |                                                                                     | Yes                                                                                 | Yes                                                                                 | Yes                                                                                 |
| Vehicle Extension (s) | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Recall Mode           | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                               | C-Min                                                                               |                                                                                     | None                                                                                | None                                                                                | C-Min                                                                               |
| Act Effect Green (s)  | 21.4                                                                              | 21.4                                                                              | 160.0                                                                             | 18.1                                                                              | 18.1                                                                              | 160.0                                                                             | 20.4                                                                               | 67.2                                                                                |                                                                                     |                                                                                     | 33.4                                                                                | 80.1                                                                                |
| Actuated g/C Ratio    | 0.13                                                                              | 0.13                                                                              | 1.00                                                                              | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.13                                                                               | 0.42                                                                                |                                                                                     |                                                                                     | 0.21                                                                                | 0.50                                                                                |
| v/c Ratio             | 0.77                                                                              | 0.77                                                                              | 0.20                                                                              | 0.57                                                                              | 0.71                                                                              | 0.02                                                                              | 0.74                                                                               | 0.93                                                                                |                                                                                     |                                                                                     | 1.59                                                                                | 0.69                                                                                |
| Control Delay         | 88.7                                                                              | 88.7                                                                              | 0.3                                                                               | 77.5                                                                              | 86.2                                                                              | 0.0                                                                               | 76.4                                                                               | 53.7                                                                                |                                                                                     |                                                                                     | 383.0                                                                               | 35.1                                                                                |
| Queue Delay           | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |
| Total Delay           | 88.7                                                                              | 88.7                                                                              | 0.3                                                                               | 77.5                                                                              | 86.2                                                                              | 0.0                                                                               | 76.4                                                                               | 53.7                                                                                |                                                                                     |                                                                                     | 383.0                                                                               | 35.1                                                                                |
| LOS                   | F                                                                                 | F                                                                                 | A                                                                                 | E                                                                                 | F                                                                                 | A                                                                                 | E                                                                                  | D                                                                                   |                                                                                     |                                                                                     | F                                                                                   | D                                                                                   |
| Approach Delay        |                                                                                   | 47.3                                                                              |                                                                                   |                                                                                   | 72.5                                                                              |                                                                                   |                                                                                    | 58.0                                                                                |                                                                                     |                                                                                     |                                                                                     | 50.4                                                                                |
| Approach LOS          |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     | D                                                                                   |

### Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 29 (18%), Referenced to phase 4:SBT and 8:NBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.59

Intersection Signal Delay: 54.7

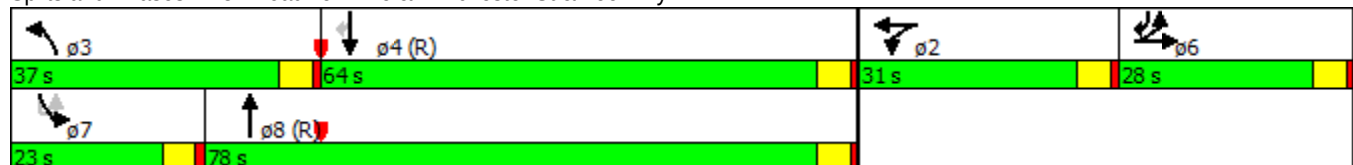
Intersection LOS: D

Intersection Capacity Utilization 74.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Broadview Ave & Winchester St & Lee Hwy



Lanes, Volumes, Timings  
3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015



| Lane Group            | SBR   |
|-----------------------|-------|
| Switch Phase          |       |
| Minimum Initial (s)   | 8.0   |
| Minimum Split (s)     | 13.0  |
| Total Split (s)       | 28.0  |
| Total Split (%)       | 17.5% |
| Maximum Green (s)     | 23.0  |
| Yellow Time (s)       | 4.0   |
| All-Red Time (s)      | 1.0   |
| Lost Time Adjust (s)  | 0.0   |
| Total Lost Time (s)   | 5.0   |
| Lead/Lag              | Lag   |
| Lead-Lag Optimize?    | Yes   |
| Vehicle Extension (s) | 3.0   |
| Recall Mode           | None  |
| Act Effect Green (s)  | 101.5 |
| Actuated g/C Ratio    | 0.63  |
| v/c Ratio             | 0.12  |
| Control Delay         | 2.8   |
| Queue Delay           | 0.0   |
| Total Delay           | 2.8   |
| LOS                   | A     |
| Approach Delay        |       |
| Approach LOS          |       |
| Intersection Summary  |       |



# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |                                                                                     |  |  |
| Volume (vph)                      | 252                                                                               | 71                                                                                | 285                                                                               | 104                                                                               | 137                                                                               | 33                                                                                | 299                                                                                | 1240                                                                                | 28                                                                                  | 8                                                                                   | 59                                                                                  | 1118                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     |                                                                                     | 1.00                                                                                | 0.95                                                                                |
| Flt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     |                                                                                     | 0.95                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3528                                                                                |                                                                                     |                                                                                     | 1770                                                                                | 3539                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     |                                                                                     | 0.12                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3528                                                                                |                                                                                     |                                                                                     | 223                                                                                 | 3539                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 274                                                                               | 77                                                                                | 310                                                                               | 113                                                                               | 149                                                                               | 36                                                                                | 325                                                                                | 1348                                                                                | 30                                                                                  | 9                                                                                   | 64                                                                                  | 1215                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 173                                                                               | 178                                                                               | 310                                                                               | 113                                                                               | 149                                                                               | 36                                                                                | 325                                                                                | 1377                                                                                | 0                                                                                   | 0                                                                                   | 73                                                                                  | 1215                                                                                |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | custom                                                                              | Prot                                                                                | NA                                                                                  |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     |                                                                                     | 7                                                                                   | 4                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 21.4                                                                              | 21.4                                                                              | 160.0                                                                             | 18.1                                                                              | 18.1                                                                              | 160.0                                                                             | 20.4                                                                               | 67.1                                                                                |                                                                                     |                                                                                     | 33.4                                                                                | 80.1                                                                                |
| Effective Green, g (s)            | 21.4                                                                              | 21.4                                                                              | 160.0                                                                             | 18.1                                                                              | 18.1                                                                              | 160.0                                                                             | 20.4                                                                               | 67.1                                                                                |                                                                                     |                                                                                     | 33.4                                                                                | 80.1                                                                                |
| Actuated g/C Ratio                | 0.13                                                                              | 0.13                                                                              | 1.00                                                                              | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.13                                                                               | 0.42                                                                                |                                                                                     |                                                                                     | 0.21                                                                                | 0.50                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 224                                                                               | 230                                                                               | 1583                                                                              | 200                                                                               | 210                                                                               | 1583                                                                              | 437                                                                                | 1479                                                                                |                                                                                     |                                                                                     | 46                                                                                  | 1771                                                                                |
| v/s Ratio Prot                    | 0.10                                                                              | c0.10                                                                             |                                                                                   | 0.06                                                                              | c0.08                                                                             |                                                                                   | 0.09                                                                               | c0.39                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.34                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     | c0.33                                                                               |                                                                                     |
| v/c Ratio                         | 0.77                                                                              | 0.77                                                                              | 0.20                                                                              | 0.56                                                                              | 0.71                                                                              | 0.02                                                                              | 0.74                                                                               | 0.93                                                                                |                                                                                     |                                                                                     | 1.59                                                                                | 0.69                                                                                |
| Uniform Delay, d1                 | 66.9                                                                              | 67.0                                                                              | 0.0                                                                               | 67.2                                                                              | 68.4                                                                              | 0.0                                                                               | 67.3                                                                               | 44.2                                                                                |                                                                                     |                                                                                     | 63.3                                                                                | 30.4                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.99                                                                               | 0.98                                                                                |                                                                                     |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 15.2                                                                              | 14.9                                                                              | 0.3                                                                               | 3.6                                                                               | 10.5                                                                              | 0.0                                                                               | 6.2                                                                                | 11.0                                                                                |                                                                                     |                                                                                     | 345.1                                                                               | 2.2                                                                                 |
| Delay (s)                         | 82.1                                                                              | 81.9                                                                              | 0.3                                                                               | 70.8                                                                              | 78.9                                                                              | 0.0                                                                               | 73.1                                                                               | 54.2                                                                                |                                                                                     |                                                                                     | 408.4                                                                               | 32.6                                                                                |
| Level of Service                  | F                                                                                 | F                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                  | D                                                                                   |                                                                                     |                                                                                     | F                                                                                   | C                                                                                   |
| Approach Delay (s)                |                                                                                   | 43.7                                                                              |                                                                                   |                                                                                   | 66.3                                                                              |                                                                                   |                                                                                    | 57.8                                                                                |                                                                                     |                                                                                     |                                                                                     | 50.2                                                                                |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | E                                                                                   |                                                                                     |                                                                                     |                                                                                     | D                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 53.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.03                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 74.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                        |       |
|------------------------|-------|
| Movement               | SBR   |
| Lane Configurations    |       |
| Volume (vph)           | 111   |
| Ideal Flow (vphpl)     | 1900  |
| Total Lost time (s)    | 5.0   |
| Lane Util. Factor      | 1.00  |
| Frt                    | 0.85  |
| Flt Protected          | 1.00  |
| Satd. Flow (prot)      | 1583  |
| Flt Permitted          | 1.00  |
| Satd. Flow (perm)      | 1583  |
| Peak-hour factor, PHF  | 0.92  |
| Adj. Flow (vph)        | 121   |
| RTOR Reduction (vph)   | 30    |
| Lane Group Flow (vph)  | 91    |
| Turn Type              | pm+ov |
| Protected Phases       | 6     |
| Permitted Phases       | 4     |
| Actuated Green, G (s)  | 101.5 |
| Effective Green, g (s) | 101.5 |
| Actuated g/C Ratio     | 0.63  |
| Clearance Time (s)     | 5.0   |
| Vehicle Extension (s)  | 3.0   |
| Lane Grp Cap (vph)     | 1004  |
| v/s Ratio Prot         | 0.01  |
| v/s Ratio Perm         | 0.05  |
| v/c Ratio              | 0.09  |
| Uniform Delay, d1      | 11.3  |
| Progression Factor     | 1.00  |
| Incremental Delay, d2  | 0.0   |
| Delay (s)              | 11.4  |
| Level of Service       | B     |
| Approach Delay (s)     |       |
| Approach LOS           |       |
| Intersection Summary   |       |

# Lanes, Volumes, Timings

## 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group                        | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |  |                                                                                     |                                                                                     |  |
| Volume (vph)                      | 8                                                                                 | 0                                                                                 | 131                                                                               | 2                                                                                 | 0                                                                                 | 13                                                                                | 4                                                                                  | 110                                                                                 | 1407                                                                                | 19                                                                                  | 4                                                                                   | 32                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)               | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                    | 210                                                                                 |                                                                                     | 0                                                                                   |                                                                                     | 200                                                                                 |
| Storage Lanes                     | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                    | 1                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 1                                                                                   |
| Taper Length (ft)                 | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   |                                                                                    | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 0.873                                                                             |                                                                                   |                                                                                   | 0.882                                                                             |                                                                                   |                                                                                    |                                                                                     | 0.998                                                                               |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     |                                                                                   | 0.997                                                                             |                                                                                   |                                                                                   | 0.994                                                                             |                                                                                   |                                                                                    | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |
| Satd. Flow (prot)                 | 0                                                                                 | 1621                                                                              | 0                                                                                 | 0                                                                                 | 1633                                                                              | 0                                                                                 | 0                                                                                  | 1770                                                                                | 3532                                                                                | 0                                                                                   | 0                                                                                   | 1770                                                                                |
| Flt Permitted                     |                                                                                   | 0.997                                                                             |                                                                                   |                                                                                   | 0.994                                                                             |                                                                                   |                                                                                    | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |
| Satd. Flow (perm)                 | 0                                                                                 | 1621                                                                              | 0                                                                                 | 0                                                                                 | 1633                                                                              | 0                                                                                 | 0                                                                                  | 1770                                                                                | 3532                                                                                | 0                                                                                   | 0                                                                                   | 1770                                                                                |
| Link Speed (mph)                  |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                    |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)                |                                                                                   | 381                                                                               |                                                                                   |                                                                                   | 519                                                                               |                                                                                   |                                                                                    |                                                                                     | 1286                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)                   |                                                                                   | 8.7                                                                               |                                                                                   |                                                                                   | 11.8                                                                              |                                                                                   |                                                                                    |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 9                                                                                 | 0                                                                                 | 142                                                                               | 2                                                                                 | 0                                                                                 | 14                                                                                | 4                                                                                  | 120                                                                                 | 1529                                                                                | 21                                                                                  | 4                                                                                   | 35                                                                                  |
| Shared Lane Traffic (%)           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)             | 0                                                                                 | 151                                                                               | 0                                                                                 | 0                                                                                 | 16                                                                                | 0                                                                                 | 0                                                                                  | 124                                                                                 | 1550                                                                                | 0                                                                                   | 0                                                                                   | 39                                                                                  |
| Enter Blocked Intersection        | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                 | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  |
| Lane Alignment                    | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              | Right                                                                             | R NA                                                                               | Left                                                                                | Left                                                                                | Right                                                                               | R NA                                                                                | Left                                                                                |
| Median Width(ft)                  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                    |                                                                                     | 24                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Link Offset(ft)                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                    |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Crosswalk Width(ft)               |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |                                                                                   |                                                                                    |                                                                                     | 16                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Two way Left Turn Lane            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Headway Factor                    | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Turning Speed (mph)               | 15                                                                                |                                                                                   | 9                                                                                 | 15                                                                                |                                                                                   | 9                                                                                 | 9                                                                                  | 15                                                                                  |                                                                                     | 9                                                                                   | 9                                                                                   | 15                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Area Type:                        | Other                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Type:                     | Unsignalized                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 66.5%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service C                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# Lanes, Volumes, Timings

## 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015



| Lane Group                 | SBT   | SBR   |
|----------------------------|-------|-------|
| Lane Configurations        | ↑↑    |       |
| Volume (vph)               | 1428  | 33    |
| Ideal Flow (vphpl)         | 1900  | 1900  |
| Storage Length (ft)        |       | 0     |
| Storage Lanes              |       | 0     |
| Taper Length (ft)          |       |       |
| Lane Util. Factor          | 0.95  | 0.95  |
| Frt                        | 0.997 |       |
| Flt Protected              |       |       |
| Satd. Flow (prot)          | 3529  | 0     |
| Flt Permitted              |       |       |
| Satd. Flow (perm)          | 3529  | 0     |
| Link Speed (mph)           | 40    |       |
| Link Distance (ft)         | 618   |       |
| Travel Time (s)            | 10.5  |       |
| Peak Hour Factor           | 0.92  | 0.92  |
| Adj. Flow (vph)            | 1552  | 36    |
| Shared Lane Traffic (%)    |       |       |
| Lane Group Flow (vph)      | 1588  | 0     |
| Enter Blocked Intersection | No    | No    |
| Lane Alignment             | Left  | Right |
| Median Width(ft)           | 24    |       |
| Link Offset(ft)            | 0     |       |
| Crosswalk Width(ft)        | 16    |       |
| Two way Left Turn Lane     |       |       |
| Headway Factor             | 1.00  | 1.00  |
| Turning Speed (mph)        |       | 9     |
| Sign Control               | Free  |       |
| Intersection Summary       |       |       |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |  |                                                                                     |                                                                                     |  |
| Volume (veh/h)                    | 8                                                                                 | 0                                                                                 | 131                                                                               | 2                                                                                 | 0                                                                                 | 13                                                                                | 4                                                                                   | 110                                                                                 | 1407                                                                                | 19                                                                                  | 4                                                                                   | 32                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 9                                                                                 | 0                                                                                 | 142                                                                               | 2                                                                                 | 0                                                                                 | 14                                                                                | 0                                                                                   | 120                                                                                 | 1529                                                                                | 21                                                                                  | 0                                                                                   | 35                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.74                                                                              | 0.74                                                                              | 0.74                                                                              | 0.74                                                                              | 0.74                                                                              |                                                                                   | 0.00                                                                                | 0.74                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |
| vC, conflicting volume            | 2658                                                                              | 3429                                                                              | 794                                                                               | 2767                                                                              | 3436                                                                              | 775                                                                               | 0                                                                                   | 1588                                                                                |                                                                                     |                                                                                     | 0                                                                                   | 1550                                                                                |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2535                                                                              | 3582                                                                              | 4                                                                                 | 2683                                                                              | 3593                                                                              | 775                                                                               | 0                                                                                   | 1082                                                                                |                                                                                     |                                                                                     | 0                                                                                   | 1550                                                                                |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                                 | 4.1                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 4.1                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                                 | 2.2                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 2.2                                                                                 |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 82                                                                                | 55                                                                                | 100                                                                               | 96                                                                                | 0                                                                                   | 75                                                                                  |                                                                                     |                                                                                     | 0                                                                                   | 92                                                                                  |
| cM capacity (veh/h)               | 7                                                                                 | 3                                                                                 | 794                                                                               | 5                                                                                 | 3                                                                                 | 341                                                                               | 0                                                                                   | 471                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 424                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 151                                                                               | 16                                                                                | 120                                                                               | 1020                                                                              | 530                                                                               | 35                                                                                | 1035                                                                                | 553                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 9                                                                                 | 2                                                                                 | 120                                                                               | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 142                                                                               | 14                                                                                | 0                                                                                 | 0                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                   | 36                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 110                                                                               | 33                                                                                | 471                                                                               | 1700                                                                              | 1700                                                                              | 424                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.37                                                                              | 0.50                                                                              | 0.25                                                                              | 0.60                                                                              | 0.31                                                                              | 0.08                                                                              | 0.61                                                                                | 0.33                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 263                                                                               | 41                                                                                | 25                                                                                | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 285.6                                                                             | 193.9                                                                             | 15.2                                                                              | 0.0                                                                               | 0.0                                                                               | 14.3                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 285.6                                                                             | 193.9                                                                             | 1.1                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 66.5%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis 6: Broadview Ave & Old Broadview Ave/Roebling St

2/17/2015



| Movement               | SBT  | SBR  |
|------------------------|------|------|
| Lane Configurations    | ↑↑   |      |
| Volume (veh/h)         | 1428 | 33   |
| Sign Control           | Free |      |
| Grade                  | 0%   |      |
| Peak Hour Factor       | 0.92 | 0.92 |
| Hourly flow rate (vph) | 1552 | 36   |
| Pedestrians            |      |      |
| Lane Width (ft)        |      |      |
| Walking Speed (ft/s)   |      |      |
| Percent Blockage       |      |      |
| Right turn flare (veh) |      |      |
| Median type            | None |      |
| Median storage (veh)   |      |      |
| Upstream signal (ft)   | 618  |      |
| pX, platoon unblocked  |      |      |
| vC, conflicting volume |      |      |
| vC1, stage 1 conf vol  |      |      |
| vC2, stage 2 conf vol  |      |      |
| vCu, unblocked vol     |      |      |
| tC, single (s)         |      |      |
| tC, 2 stage (s)        |      |      |
| tF (s)                 |      |      |
| p0 queue free %        |      |      |
| cM capacity (veh/h)    |      |      |
| Direction, Lane #      |      |      |

# Lanes, Volumes, Timings

## 9: Broadview Ave & Shopping Center/Chappell St

2/17/2015

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group                        | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (vph)                      | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                   | 1397                                                                                | 5                                                                                   | 7                                                                                   | 1543                                                                                | 0                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)               | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                   |                                                                                     | 0                                                                                   | 500                                                                                 |                                                                                     | 0                                                                                   |
| Storage Lanes                     | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   |
| Taper Length (ft)                 | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 0.95                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.890                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Protected                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.991                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1643                                                                              | 0                                                                                 | 1863                                                                                | 3539                                                                                | 0                                                                                   | 1770                                                                                | 3539                                                                                | 0                                                                                   |
| Flt Permitted                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.991                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1643                                                                              | 0                                                                                 | 1863                                                                                | 3539                                                                                | 0                                                                                   | 1770                                                                                | 3539                                                                                | 0                                                                                   |
| Link Speed (mph)                  |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     | 40                                                                                  |                                                                                     |
| Link Distance (ft)                |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 530                                                                               |                                                                                   |                                                                                     | 812                                                                                 |                                                                                     |                                                                                     | 1286                                                                                |                                                                                     |
| Travel Time (s)                   |                                                                                   | 2.3                                                                               |                                                                                   |                                                                                   | 12.0                                                                              |                                                                                   |                                                                                     | 13.8                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                   | 1518                                                                                | 5                                                                                   | 8                                                                                   | 1677                                                                                | 0                                                                                   |
| Shared Lane Traffic (%)           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)             | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                   | 1523                                                                                | 0                                                                                   | 8                                                                                   | 1677                                                                                | 0                                                                                   |
| Enter Blocked Intersection        | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  |
| Lane Alignment                    | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                                | Left                                                                                | Right                                                                               | Left                                                                                | Left                                                                                | Right                                                                               |
| Median Width(ft)                  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 24                                                                                  |                                                                                     |                                                                                     | 24                                                                                  |                                                                                     |
| Link Offset(ft)                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |
| Crosswalk Width(ft)               |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |                                                                                   |                                                                                     | 16                                                                                  |                                                                                     |                                                                                     | 16                                                                                  |                                                                                     |
| Two way Left Turn Lane            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Headway Factor                    | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Turning Speed (mph)               | 15                                                                                |                                                                                   | 9                                                                                 | 15                                                                                |                                                                                   | 9                                                                                 | 15                                                                                  |                                                                                     | 9                                                                                   | 15                                                                                  |                                                                                     | 9                                                                                   |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Area Type:                        | Other                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Type:                     | Unsignalized                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 52.7%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service A                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Broadview Ave & Shopping Center/Chappell St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                   | 1397                                                                                | 5                                                                                   | 7                                                                                   | 1543                                                                                | 0                                                                                   |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                   | 1518                                                                                | 5                                                                                   | 8                                                                                   | 1677                                                                                | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2460                                                                              | 3216                                                                              | 839                                                                               | 2375                                                                              | 3214                                                                              | 762                                                                               | 1677                                                                                |                                                                                     |                                                                                     | 1524                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2460                                                                              | 3216                                                                              | 839                                                                               | 2375                                                                              | 3214                                                                              | 762                                                                               | 1677                                                                                |                                                                                     |                                                                                     | 1524                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 100                                                                               | 88                                                                                | 100                                                                               | 97                                                                                | 100                                                                                 |                                                                                     |                                                                                     | 98                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 15                                                                                | 9                                                                                 | 309                                                                               | 18                                                                                | 9                                                                                 | 347                                                                               | 378                                                                                 |                                                                                     |                                                                                     | 434                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 11                                                                                | 0                                                                                 | 1012                                                                              | 512                                                                               | 8                                                                                 | 839                                                                               | 839                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 9                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 74                                                                                | 1700                                                                              | 1700                                                                              | 1700                                                                              | 434                                                                               | 1700                                                                              | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.15                                                                              | 0.00                                                                              | 0.60                                                                              | 0.30                                                                              | 0.02                                                                              | 0.49                                                                              | 0.49                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 12                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 61.5                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 13.5                                                                              | 0.0                                                                               | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 61.5                                                                              | 0.0                                                                               |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 52.7%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



Lanes, Volumes, Timings  
12: Broadview Ave & Stuyvesant St

2/17/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Group                        | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (vph)                      | 23                                                                                | 14                                                                                | 1377                                                                              | 9                                                                                 | 9                                                                                 | 1573                                                                              |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)               | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 400                                                                               |                                                                                   |
| Storage Lanes                     | 1                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   |
| Taper Length (ft)                 | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 0.95                                                                              |
| Frt                               | 0.949                                                                             |                                                                                   | 0.999                                                                             |                                                                                   |                                                                                   |                                                                                   |
| Flt Protected                     | 0.970                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (prot)                 | 1715                                                                              | 0                                                                                 | 3536                                                                              | 0                                                                                 | 1770                                                                              | 3539                                                                              |
| Flt Permitted                     | 0.970                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)                 | 1715                                                                              | 0                                                                                 | 3536                                                                              | 0                                                                                 | 1770                                                                              | 3539                                                                              |
| Link Speed (mph)                  | 30                                                                                |                                                                                   | 40                                                                                |                                                                                   |                                                                                   | 40                                                                                |
| Link Distance (ft)                | 353                                                                               |                                                                                   | 180                                                                               |                                                                                   |                                                                                   | 812                                                                               |
| Travel Time (s)                   | 8.0                                                                               |                                                                                   | 3.1                                                                               |                                                                                   |                                                                                   | 13.8                                                                              |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Adj. Flow (vph)                   | 25                                                                                | 15                                                                                | 1497                                                                              | 10                                                                                | 10                                                                                | 1710                                                                              |
| Shared Lane Traffic (%)           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)             | 40                                                                                | 0                                                                                 | 1507                                                                              | 0                                                                                 | 10                                                                                | 1710                                                                              |
| Enter Blocked Intersection        | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                |
| Lane Alignment                    | Left                                                                              | Right                                                                             | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              |
| Median Width(ft)                  | 12                                                                                |                                                                                   | 12                                                                                |                                                                                   |                                                                                   | 12                                                                                |
| Link Offset(ft)                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |
| Crosswalk Width(ft)               | 16                                                                                |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |
| Two way Left Turn Lane            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Headway Factor                    | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |
| Turning Speed (mph)               | 15                                                                                | 9                                                                                 |                                                                                   | 9                                                                                 | 15                                                                                |                                                                                   |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Area Type:                        | Other                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Control Type:                     | Unsignalized                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization | 53.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service A                                                            |                                                                                   |                                                                                   |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Broadview Ave & Stuyvesant St

2/17/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 23                                                                                | 14                                                                                | 1377                                                                              | 9                                                                                 | 9                                                                                 | 1573                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 25                                                                                | 15                                                                                | 1497                                                                              | 10                                                                                | 10                                                                                | 1710                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2376                                                                              | 753                                                                               |                                                                                   |                                                                                   | 1507                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2376                                                                              | 753                                                                               |                                                                                   |                                                                                   | 1507                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 11                                                                                | 96                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 28                                                                                | 352                                                                               |                                                                                   |                                                                                   | 440                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 40                                                                                | 998                                                                               | 509                                                                               | 10                                                                                | 855                                                                               | 855                                                                               |
| Volume Left                       | 25                                                                                | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 15                                                                                | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 43                                                                                | 1700                                                                              | 1700                                                                              | 440                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.93                                                                              | 0.59                                                                              | 0.30                                                                              | 0.02                                                                              | 0.50                                                                              | 0.50                                                                              |
| Queue Length 95th (ft)            | 92                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 259.7                                                                             | 0.0                                                                               | 0.0                                                                               | 13.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 259.7                                                                             | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 3.2                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 53.5%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# Lanes, Volumes, Timings

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/17/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group                        | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (vph)                      | 10                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 27                                                                                  | 1367                                                                                | 0                                                                                   | 0                                                                                   | 1595                                                                                | 57                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)               | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 300                                                                                 |                                                                                     | 0                                                                                   | 50                                                                                  |                                                                                     | 0                                                                                   |
| Storage Lanes                     | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   |
| Taper Length (ft)                 | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 0.95                                                                                | 1.00                                                                                | 0.95                                                                                | 0.95                                                                                |
| Frt                               |                                                                                   | 0.905                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.995                                                                               |                                                                                     |
| Flt Protected                     |                                                                                   | 0.985                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)                 | 0                                                                                 | 1660                                                                              | 0                                                                                 | 0                                                                                 | 1863                                                                              | 0                                                                                 | 1770                                                                                | 3539                                                                                | 0                                                                                   | 1863                                                                                | 3522                                                                                | 0                                                                                   |
| Flt Permitted                     |                                                                                   | 0.985                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)                 | 0                                                                                 | 1660                                                                              | 0                                                                                 | 0                                                                                 | 1863                                                                              | 0                                                                                 | 1770                                                                                | 3539                                                                                | 0                                                                                   | 1863                                                                                | 3522                                                                                | 0                                                                                   |
| Link Speed (mph)                  |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     | 40                                                                                  |                                                                                     |
| Link Distance (ft)                |                                                                                   | 313                                                                               |                                                                                   |                                                                                   | 392                                                                               |                                                                                   |                                                                                     | 800                                                                                 |                                                                                     |                                                                                     | 180                                                                                 |                                                                                     |
| Travel Time (s)                   |                                                                                   | 7.1                                                                               |                                                                                   |                                                                                   | 8.9                                                                               |                                                                                   |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 3.1                                                                                 |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 11                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 29                                                                                  | 1486                                                                                | 0                                                                                   | 0                                                                                   | 1734                                                                                | 62                                                                                  |
| Shared Lane Traffic (%)           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)             | 0                                                                                 | 37                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 29                                                                                  | 1486                                                                                | 0                                                                                   | 0                                                                                   | 1796                                                                                | 0                                                                                   |
| Enter Blocked Intersection        | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  |
| Lane Alignment                    | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                                | Left                                                                                | Right                                                                               | Left                                                                                | Left                                                                                | Right                                                                               |
| Median Width(ft)                  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 12                                                                                  |                                                                                     |                                                                                     | 12                                                                                  |                                                                                     |
| Link Offset(ft)                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |
| Crosswalk Width(ft)               |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |                                                                                   |                                                                                     | 16                                                                                  |                                                                                     |                                                                                     | 16                                                                                  |                                                                                     |
| Two way Left Turn Lane            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Headway Factor                    | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Turning Speed (mph)               | 15                                                                                |                                                                                   | 9                                                                                 | 15                                                                                |                                                                                   | 9                                                                                 | 15                                                                                  |                                                                                     | 9                                                                                   | 15                                                                                  |                                                                                     | 9                                                                                   |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Area Type:                        | Other                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Type:                     | Unsignalized                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 61.3%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service B                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 10                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 27                                                                                  | 1367                                                                                | 0                                                                                   | 0                                                                                   | 1595                                                                                | 57                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 11                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 29                                                                                  | 1486                                                                                | 0                                                                                   | 0                                                                                   | 1734                                                                                | 62                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2567                                                                              | 3309                                                                              | 898                                                                               | 2438                                                                              | 3340                                                                              | 743                                                                               | 1796                                                                                |                                                                                     |                                                                                     | 1486                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2567                                                                              | 3309                                                                              | 898                                                                               | 2438                                                                              | 3340                                                                              | 743                                                                               | 1796                                                                                |                                                                                     |                                                                                     | 1486                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 91                                                                                | 100                                                                               | 85                                                                                | 100                                                                               | 91                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 11                                                                                | 8                                                                                 | 282                                                                               | 14                                                                                | 7                                                                                 | 358                                                                               | 340                                                                                 |                                                                                     |                                                                                     | 448                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 37                                                                                | 1                                                                                 | 29                                                                                | 991                                                                               | 495                                                                               | 0                                                                                 | 1156                                                                                | 640                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 11                                                                                | 0                                                                                 | 29                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 62                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 33                                                                                | 7                                                                                 | 340                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.11                                                                              | 0.15                                                                              | 0.09                                                                              | 0.58                                                                              | 0.29                                                                              | 0.00                                                                              | 0.68                                                                                | 0.38                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 99                                                                                | 9                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 370.6                                                                             | 575.8                                                                             | 16.6                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 370.6                                                                             | 575.8                                                                             | 0.3                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 4.4                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.3%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Lanes, Volumes, Timings  
16: Broadview Ave & Church St

2/17/2015

|                                   |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Lane Group                        | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBU                                                                               | SBL                                                                               | SBT                                                                                |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |  |
| Volume (vph)                      | 4                                                                                 | 66                                                                                | 1279                                                                              | 10                                                                                | 1                                                                                 | 35                                                                                | 1645                                                                               |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               |
| Storage Length (ft)               | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   | 400                                                                               |                                                                                    |
| Storage Lanes                     | 1                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   | 1                                                                                 |                                                                                    |
| Taper Length (ft)                 | 25                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                    |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 0.95                                                                               |
| Frt                               | 0.872                                                                             |                                                                                   | 0.999                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Flt Protected                     | 0.997                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                    |
| Satd. Flow (prot)                 | 1619                                                                              | 0                                                                                 | 3536                                                                              | 0                                                                                 | 0                                                                                 | 1770                                                                              | 3539                                                                               |
| Flt Permitted                     | 0.997                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                    |
| Satd. Flow (perm)                 | 1619                                                                              | 0                                                                                 | 3536                                                                              | 0                                                                                 | 0                                                                                 | 1770                                                                              | 3539                                                                               |
| Link Speed (mph)                  | 30                                                                                |                                                                                   | 40                                                                                |                                                                                   |                                                                                   |                                                                                   | 40                                                                                 |
| Link Distance (ft)                | 557                                                                               |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   | 800                                                                                |
| Travel Time (s)                   | 12.7                                                                              |                                                                                   | 16.6                                                                              |                                                                                   |                                                                                   |                                                                                   | 13.6                                                                               |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               |
| Adj. Flow (vph)                   | 4                                                                                 | 72                                                                                | 1390                                                                              | 11                                                                                | 1                                                                                 | 38                                                                                | 1788                                                                               |
| Shared Lane Traffic (%)           |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Lane Group Flow (vph)             | 76                                                                                | 0                                                                                 | 1401                                                                              | 0                                                                                 | 0                                                                                 | 39                                                                                | 1788                                                                               |
| Enter Blocked Intersection        | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                 |
| Lane Alignment                    | Left                                                                              | Right                                                                             | Left                                                                              | Right                                                                             | R NA                                                                              | Left                                                                              | Left                                                                               |
| Median Width(ft)                  | 12                                                                                |                                                                                   | 12                                                                                |                                                                                   |                                                                                   |                                                                                   | 12                                                                                 |
| Link Offset(ft)                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                  |
| Crosswalk Width(ft)               | 16                                                                                |                                                                                   | 16                                                                                |                                                                                   |                                                                                   |                                                                                   | 16                                                                                 |
| Two way Left Turn Lane            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Headway Factor                    | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               |
| Turning Speed (mph)               | 15                                                                                | 9                                                                                 |                                                                                   | 9                                                                                 | 9                                                                                 | 15                                                                                |                                                                                    |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   |                                                                                   | Free                                                                               |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Area Type:                        | Other                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Control Type:                     | Unsignalized                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Intersection Capacity Utilization | 56.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service B                                                            |                                                                                   |                                                                                   |                                                                                    |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/17/2015

|                                   |  |  |                                                                                    |  |  |  |                                                                                       |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                                                                                                                 | NBR                                                                               | SBU                                                                               | SBL                                                                               | SBT                                                                                                                                                                    |
| Lane Configurations               |  |                                                                                   |   |                                                                                   |                                                                                   |  |   |
| Volume (veh/h)                    | 4                                                                                 | 66                                                                                | 1279                                                                                                                                                                | 10                                                                                | 1                                                                                 | 35                                                                                | 1645                                                                                                                                                                   |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                                                                                                                |                                                                                   |                                                                                   |                                                                                   | Free                                                                                                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                                                                                                  |                                                                                   |                                                                                   |                                                                                   | 0%                                                                                                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                                                                                                | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                                                                                                   |
| Hourly flow rate (vph)            | 4                                                                                 | 72                                                                                | 1390                                                                                                                                                                | 11                                                                                | 0                                                                                 | 38                                                                                | 1788                                                                                                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Median type                       |                                                                                   |                                                                                   | None                                                                                                                                                                |                                                                                   |                                                                                   | None                                                                              |                                                                                                                                                                        |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                                                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| pX, platoon unblocked             | 0.89                                                                              | 0.89                                                                              |                                                                                                                                                                     |                                                                                   | 0.00                                                                              | 0.89                                                                              |                                                                                                                                                                        |
| vC, conflicting volume            | 2366                                                                              | 701                                                                               |                                                                                                                                                                     |                                                                                   | 0                                                                                 | 1401                                                                              |                                                                                                                                                                        |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| vCu, unblocked vol                | 2284                                                                              | 403                                                                               |                                                                                                                                                                     |                                                                                   | 0                                                                                 | 1194                                                                              |                                                                                                                                                                        |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                                                                                                     |                                                                                   | 0.0                                                                               | 4.1                                                                               |                                                                                                                                                                        |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                                                                                                     |                                                                                   | 0.0                                                                               | 2.2                                                                               |                                                                                                                                                                        |
| p0 queue free %                   | 84                                                                                | 86                                                                                |                                                                                                                                                                     |                                                                                   | 0                                                                                 | 93                                                                                |                                                                                                                                                                        |
| cM capacity (veh/h)               | 27                                                                                | 529                                                                               |                                                                                                                                                                     |                                                                                   | 0                                                                                 | 514                                                                               |                                                                                                                                                                        |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                                                                                                                | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |                                                                                                                                                                        |
| Volume Total                      | 76                                                                                | 927                                                                               | 474                                                                                                                                                                 | 38                                                                                | 894                                                                               | 894                                                                               |                                                                                                                                                                        |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                                                                                                   | 38                                                                                | 0                                                                                 | 0                                                                                 |                                                                                                                                                                        |
| Volume Right                      | 72                                                                                | 0                                                                                 | 11                                                                                                                                                                  | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                                                                                                        |
| cSH                               | 258                                                                               | 1700                                                                              | 1700                                                                                                                                                                | 514                                                                               | 1700                                                                              | 1700                                                                              |                                                                                                                                                                        |
| Volume to Capacity                | 0.29                                                                              | 0.55                                                                              | 0.28                                                                                                                                                                | 0.07                                                                              | 0.53                                                                              | 0.53                                                                              |                                                                                                                                                                        |
| Queue Length 95th (ft)            | 30                                                                                | 0                                                                                 | 0                                                                                                                                                                   | 6                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                                                                                                        |
| Control Delay (s)                 | 24.6                                                                              | 0.0                                                                               | 0.0                                                                                                                                                                 | 12.6                                                                              | 0.0                                                                               | 0.0                                                                               |                                                                                                                                                                        |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                                                                                                     | B                                                                                 |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Approach Delay (s)                | 24.6                                                                              | 0.0                                                                               |                                                                                                                                                                     | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                                                                                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Average Delay                     |                                                                                   |                                                                                   | 0.7                                                                                                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.4%                                                                                                                                                               |                                                                                   | ICU Level of Service                                                              |                                                                                   | B                                                                                                                                                                      |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                                                                                                        |

# Lanes, Volumes, Timings

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015

|                            |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group                 | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations        |  |  |  |                                                                                   |  |  |  |  |  |  |  |  |
| Volume (vph)               | 548                                                                               | 117                                                                               | 76                                                                                | 68                                                                                | 310                                                                               | 121                                                                               | 337                                                                                 | 585                                                                                 | 19                                                                                  | 75                                                                                  | 601                                                                                 | 950                                                                                 |
| Ideal Flow (vphpl)         | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)        | 0                                                                                 |                                                                                   | 565                                                                               | 0                                                                                 |                                                                                   | 0                                                                                 | 581                                                                                 |                                                                                     | 180                                                                                 | 400                                                                                 |                                                                                     | 350                                                                                 |
| Storage Lanes              | 1                                                                                 |                                                                                   | 1                                                                                 | 0                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   |
| Taper Length (ft)          | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Lane Util. Factor          | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                        |                                                                                   |                                                                                   | 0.850                                                                             |                                                                                   |                                                                                   | 0.850                                                                             |                                                                                     |                                                                                     | 0.850                                                                               |                                                                                     |                                                                                     | 0.850                                                                               |
| Flt Protected              | 0.950                                                                             | 0.968                                                                             |                                                                                   |                                                                                   | 0.991                                                                             |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (prot)          | 1681                                                                              | 1713                                                                              | 1583                                                                              | 0                                                                                 | 3507                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted              | 0.950                                                                             | 0.968                                                                             |                                                                                   |                                                                                   | 0.991                                                                             |                                                                                   | 0.950                                                                               |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)          | 1681                                                                              | 1713                                                                              | 1583                                                                              | 0                                                                                 | 3507                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Right Turn on Red          |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |
| Satd. Flow (RTOR)          |                                                                                   |                                                                                   | 89                                                                                |                                                                                   |                                                                                   | 132                                                                               |                                                                                     |                                                                                     | 89                                                                                  |                                                                                     |                                                                                     | 520                                                                                 |
| Link Speed (mph)           |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     | 40                                                                                  |                                                                                     |
| Link Distance (ft)         |                                                                                   | 840                                                                               |                                                                                   |                                                                                   | 523                                                                               |                                                                                   |                                                                                     | 878                                                                                 |                                                                                     |                                                                                     | 976                                                                                 |                                                                                     |
| Travel Time (s)            |                                                                                   | 19.1                                                                              |                                                                                   |                                                                                   | 11.9                                                                              |                                                                                   |                                                                                     | 15.0                                                                                |                                                                                     |                                                                                     | 16.6                                                                                |                                                                                     |
| Peak Hour Factor           | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)            | 596                                                                               | 127                                                                               | 83                                                                                | 74                                                                                | 337                                                                               | 132                                                                               | 366                                                                                 | 636                                                                                 | 21                                                                                  | 82                                                                                  | 653                                                                                 | 1033                                                                                |
| Shared Lane Traffic (%)    | 40%                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)      | 358                                                                               | 365                                                                               | 83                                                                                | 0                                                                                 | 411                                                                               | 132                                                                               | 366                                                                                 | 636                                                                                 | 21                                                                                  | 82                                                                                  | 653                                                                                 | 1033                                                                                |
| Enter Blocked Intersection | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  | No                                                                                  |
| Lane Alignment             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                              | Left                                                                              | Right                                                                             | Left                                                                                | Left                                                                                | Right                                                                               | Left                                                                                | Left                                                                                | Right                                                                               |
| Median Width(ft)           |                                                                                   | 12                                                                                |                                                                                   |                                                                                   | 12                                                                                |                                                                                   |                                                                                     | 12                                                                                  |                                                                                     |                                                                                     | 12                                                                                  |                                                                                     |
| Link Offset(ft)            |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |
| Crosswalk Width(ft)        |                                                                                   | 16                                                                                |                                                                                   |                                                                                   | 16                                                                                |                                                                                   |                                                                                     | 16                                                                                  |                                                                                     |                                                                                     | 16                                                                                  |                                                                                     |
| Two way Left Turn Lane     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Headway Factor             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Turning Speed (mph)        | 15                                                                                |                                                                                   | 15                                                                                | 15                                                                                |                                                                                   | 15                                                                                | 15                                                                                  |                                                                                     | 15                                                                                  | 15                                                                                  |                                                                                     | 15                                                                                  |
| Number of Detectors        | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                   | 2                                                                                   | 1                                                                                   | 1                                                                                   | 2                                                                                   | 1                                                                                   |
| Detector Template          | Left                                                                              | Thru                                                                              | Right                                                                             | Left                                                                              | Thru                                                                              | Right                                                                             | Left                                                                                | Thru                                                                                | Right                                                                               | Left                                                                                | Thru                                                                                | Right                                                                               |
| Leading Detector (ft)      | 20                                                                                | 100                                                                               | 20                                                                                | 20                                                                                | 100                                                                               | 20                                                                                | 20                                                                                  | 100                                                                                 | 20                                                                                  | 20                                                                                  | 100                                                                                 | 20                                                                                  |
| Trailing Detector (ft)     | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Detector 1 Position(ft)    | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Detector 1 Size(ft)        | 20                                                                                | 6                                                                                 | 20                                                                                | 20                                                                                | 6                                                                                 | 20                                                                                | 20                                                                                  | 6                                                                                   | 20                                                                                  | 20                                                                                  | 6                                                                                   | 20                                                                                  |
| Detector 1 Type            | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                             | Cl+Ex                                                                               | Cl+Ex                                                                               | Cl+Ex                                                                               | Cl+Ex                                                                               | Cl+Ex                                                                               | Cl+Ex                                                                               |
| Detector 1 Channel         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector 1 Extend (s)      | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 1 Queue (s)       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 1 Delay (s)       | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Detector 2 Position(ft)    |                                                                                   | 94                                                                                |                                                                                   |                                                                                   | 94                                                                                |                                                                                   |                                                                                     | 94                                                                                  |                                                                                     |                                                                                     | 94                                                                                  |                                                                                     |
| Detector 2 Size(ft)        |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |                                                                                     |
| Detector 2 Type            |                                                                                   | Cl+Ex                                                                             |                                                                                   |                                                                                   | Cl+Ex                                                                             |                                                                                   |                                                                                     | Cl+Ex                                                                               |                                                                                     |                                                                                     | Cl+Ex                                                                               |                                                                                     |
| Detector 2 Channel         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector 2 Extend (s)      |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |
| Turn Type                  | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases           | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases           |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Detector Phase             | 6                                                                                 | 6                                                                                 | 6                                                                                 | 2                                                                                 | 2                                                                                 | 2                                                                                 | 3                                                                                   | 8                                                                                   | 8                                                                                   | 7                                                                                   | 4                                                                                   | 4                                                                                   |

# Lanes, Volumes, Timings

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015



| Lane Group            | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Switch Phase          |       |       |       |       |       |       |       |       |       |       |       |       |
| Minimum Initial (s)   | 20.0  | 20.0  | 20.0  | 20.0  | 20.0  | 20.0  | 4.0   | 20.0  | 20.0  | 8.0   | 20.0  | 20.0  |
| Minimum Split (s)     | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  | 8.0   | 24.0  | 24.0  | 12.0  | 24.0  | 24.0  |
| Total Split (s)       | 40.0  | 40.0  | 40.0  | 26.0  | 26.0  | 26.0  | 24.0  | 64.0  | 64.0  | 30.0  | 70.0  | 70.0  |
| Total Split (%)       | 25.0% | 25.0% | 25.0% | 16.3% | 16.3% | 16.3% | 15.0% | 40.0% | 40.0% | 18.8% | 43.8% | 43.8% |
| Maximum Green (s)     | 36.0  | 36.0  | 36.0  | 22.0  | 22.0  | 22.0  | 20.0  | 60.0  | 60.0  | 26.0  | 66.0  | 66.0  |
| Yellow Time (s)       | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)      | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   | 0.5   |
| Lost Time Adjust (s)  | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |
| Lead/Lag              | Lag   | Lag   | Lag   | Lead  | Lead  | Lead  | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?    | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Vehicle Extension (s) | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |
| Recall Mode           | None  | None  | None  | None  | None  | None  | None  | C-Min | C-Min | None  | C-Min | C-Min |
| Act Effect Green (s)  | 35.6  | 35.6  | 35.6  |       | 21.6  | 21.6  | 20.8  | 74.0  | 74.0  | 12.8  | 66.0  | 66.0  |
| Actuated g/C Ratio    | 0.22  | 0.22  | 0.22  |       | 0.14  | 0.14  | 0.13  | 0.46  | 0.46  | 0.08  | 0.41  | 0.41  |
| v/c Ratio             | 0.96  | 0.96  | 0.20  |       | 0.87  | 0.40  | 1.59  | 0.39  | 0.03  | 0.58  | 0.45  | 1.08  |
| Control Delay         | 97.5  | 97.2  | 8.9   |       | 86.6  | 13.0  | 328.2 | 29.7  | 0.1   | 69.9  | 49.9  | 89.1  |
| Queue Delay           | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay           | 97.5  | 97.2  | 8.9   |       | 86.6  | 13.0  | 328.2 | 29.7  | 0.1   | 69.9  | 49.9  | 89.1  |
| LOS                   | F     | F     | A     |       | F     | B     | F     | C     | A     | E     | D     | F     |
| Approach Delay        |       | 88.2  |       |       | 68.7  |       |       | 135.9 |       |       | 73.7  |       |
| Approach LOS          |       | F     |       |       | E     |       |       | F     |       |       | E     |       |

### Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 29 (18%), Referenced to phase 4:SBT and 8:NBT, Start of Green

Natural Cycle: 135

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.59

Intersection Signal Delay: 91.3

Intersection LOS: F

Intersection Capacity Utilization 104.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

|                                                                                              |                                                                                                  |                                                                                              |                                                                                                |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|  $\phi 3$ |  $\phi 4 (R)$ |  $\phi 2$ |  $\phi 6$ |
| 24 s                                                                                         | 70 s                                                                                             | 26 s                                                                                         | 40 s                                                                                           |
|  $\phi 7$ |  $\phi 8 (R)$ |                                                                                              |                                                                                                |
| 30 s                                                                                         | 64 s                                                                                             |                                                                                              |                                                                                                |



# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |    |  |  |  |  |  |
| Volume (vph)                      | 548                                                                               | 117                                                                               | 76                                                                                | 68                                                                                | 310                                                                               | 121                                                                               | 337                                                                                 | 585                                                                                 | 19                                                                                  | 75                                                                                  | 601                                                                                 | 950                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 596                                                                               | 127                                                                               | 83                                                                                | 74                                                                                | 337                                                                               | 132                                                                               | 366                                                                                 | 636                                                                                 | 21                                                                                  | 82                                                                                  | 653                                                                                 | 1033                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 65                                                                                | 0                                                                                 | 0                                                                                 | 114                                                                               | 0                                                                                   | 0                                                                                   | 11                                                                                  | 0                                                                                   | 0                                                                                   | 306                                                                                 |
| Lane Group Flow (vph)             | 358                                                                               | 365                                                                               | 18                                                                                | 0                                                                                 | 411                                                                               | 18                                                                                | 366                                                                                 | 636                                                                                 | 10                                                                                  | 82                                                                                  | 653                                                                                 | 728                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 35.6                                                                              | 35.6                                                                              | 35.6                                                                              |                                                                                   | 21.6                                                                              | 21.6                                                                              | 20.8                                                                                | 74.0                                                                                | 74.0                                                                                | 12.8                                                                                | 66.0                                                                                | 66.0                                                                                |
| Effective Green, g (s)            | 35.6                                                                              | 35.6                                                                              | 35.6                                                                              |                                                                                   | 21.6                                                                              | 21.6                                                                              | 20.8                                                                                | 74.0                                                                                | 74.0                                                                                | 12.8                                                                                | 66.0                                                                                | 66.0                                                                                |
| Actuated g/C Ratio                | 0.22                                                                              | 0.22                                                                              | 0.22                                                                              |                                                                                   | 0.14                                                                              | 0.14                                                                              | 0.13                                                                                | 0.46                                                                                | 0.46                                                                                | 0.08                                                                                | 0.41                                                                                | 0.41                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 374                                                                               | 381                                                                               | 352                                                                               |                                                                                   | 473                                                                               | 213                                                                               | 230                                                                                 | 1636                                                                                | 732                                                                                 | 141                                                                                 | 1459                                                                                | 652                                                                                 |
| v/s Ratio Prot                    | c0.21                                                                             | 0.21                                                                              |                                                                                   |                                                                                   | c0.12                                                                             |                                                                                   | c0.21                                                                               | 0.18                                                                                |                                                                                     | 0.05                                                                                | 0.18                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | c0.46                                                                               |
| v/c Ratio                         | 0.96                                                                              | 0.96                                                                              | 0.05                                                                              |                                                                                   | 0.87                                                                              | 0.08                                                                              | 1.59                                                                                | 0.39                                                                                | 0.01                                                                                | 0.58                                                                                | 0.45                                                                                | 1.12                                                                                |
| Uniform Delay, d1                 | 61.4                                                                              | 61.5                                                                              | 48.9                                                                              |                                                                                   | 67.8                                                                              | 60.5                                                                              | 69.6                                                                                | 28.2                                                                                | 23.3                                                                                | 71.0                                                                                | 33.9                                                                                | 47.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 0.78                                                                                | 1.44                                                                                | 1.91                                                                                |
| Incremental Delay, d2             | 35.1                                                                              | 34.9                                                                              | 0.1                                                                               |                                                                                   | 15.5                                                                              | 0.2                                                                               | 285.7                                                                               | 0.7                                                                                 | 0.0                                                                                 | 5.4                                                                                 | 0.9                                                                                 | 70.0                                                                                |
| Delay (s)                         | 96.5                                                                              | 96.3                                                                              | 49.0                                                                              |                                                                                   | 83.3                                                                              | 60.7                                                                              | 355.3                                                                               | 28.9                                                                                | 23.3                                                                                | 61.0                                                                                | 49.5                                                                                | 159.9                                                                               |
| Level of Service                  | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | F                                                                                 | E                                                                                 | F                                                                                   | C                                                                                   | C                                                                                   | E                                                                                   | D                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 91.5                                                                              |                                                                                   |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                     | 145.5                                                                               |                                                                                     |                                                                                     | 114.6                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 112.9                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.11                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 104.2%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
PM Existing

2/17/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | UL  | T   |
| Maximum Queue (ft)    | 202 | 271 | 140 | 130 | 191 | 78 | 189 | 301 | 426 | 436 | 134 | 509 |
| Average Queue (ft)    | 142 | 213 | 72  | 92  | 138 | 26 | 134 | 188 | 289 | 300 | 66  | 344 |
| 95th Queue (ft)       | 253 | 294 | 166 | 186 | 230 | 85 | 218 | 323 | 463 | 471 | 146 | 558 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     | 0   |     |     | 0   |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     | 0   |     |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 11  |     |     | 60  | 0  |     | 0   | 9   |     |     | 36  |
| Queuing Penalty (veh) | 0   | 14  |     |     | 20  | 0  |     | 0   | 27  |     |     | 24  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 496 | 188 |
| Average Queue (ft)    | 344 | 93  |
| 95th Queue (ft)       | 561 | 253 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 24  | 0   |
| Queuing Penalty (veh) | 26  | 0   |

Intersection: 6: Broadview Ave & Old Broadview Ave/Roebling St

| Movement              | EB  | WB  | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|
| Directions Served     | LTR | LTR | UL  | UL  | T   | TR  |
| Maximum Queue (ft)    | 132 | 30  | 115 | 41  | 3   | 4   |
| Average Queue (ft)    | 93  | 16  | 62  | 21  | 1   | 1   |
| 95th Queue (ft)       | 154 | 40  | 130 | 51  | 7   | 7   |
| Link Distance (ft)    | 329 | 466 |     |     | 555 | 555 |
| Upstream Blk Time (%) |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 210 | 200 |     |     |
| Storage Blk Time (%)  |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |

Queuing and Blocking Report  
PM Existing

2/17/2015

Intersection: 9: Broadview Ave & Shopping Center/Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LTR | L   |
| Maximum Queue (ft)    | 27  | 18  |
| Average Queue (ft)    | 10  | 6   |
| 95th Queue (ft)       | 44  | 24  |
| Link Distance (ft)    | 477 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Broadview Ave & Stuyvesant St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 101 | 14  |
| Average Queue (ft)    | 61  | 3   |
| 95th Queue (ft)       | 122 | 17  |
| Link Distance (ft)    | 293 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 400 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LTR | L   | TR  | TR  |
| Maximum Queue (ft)    | 70  | 48  | 4   | 14  |
| Average Queue (ft)    | 46  | 17  | 1   | 4   |
| 95th Queue (ft)       | 112 | 53  | 7   | 23  |
| Link Distance (ft)    | 266 |     | 750 | 117 |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |     |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |                                                                                    |   |  |  |                                                                                     |  |
| Volume (vph)                      | 153                                                                               | 67                                                                                | 266                                                                               | 96                                                                                | 110                                                                               | 57                                                                                | 7                                                                                  | 337                                                                                 | 986                                                                                 | 57                                                                                  | 17                                                                                  | 81                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               |                                                                                    | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.97                                                                                | 0.95                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                    | 1.00                                                                                | 0.99                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.95                                                                                | 1.00                                                                                |                                                                                     |                                                                                     | 0.95                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              |                                                                                    | 3433                                                                                | 3510                                                                                |                                                                                     |                                                                                     | 1770                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.07                                                                                | 1.00                                                                                |                                                                                     |                                                                                     | 0.07                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              |                                                                                    | 254                                                                                 | 3510                                                                                |                                                                                     |                                                                                     | 131                                                                                 |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 166                                                                               | 73                                                                                | 289                                                                               | 104                                                                               | 120                                                                               | 62                                                                                | 8                                                                                  | 366                                                                                 | 1072                                                                                | 62                                                                                  | 18                                                                                  | 88                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 3                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 118                                                                               | 121                                                                               | 289                                                                               | 104                                                                               | 120                                                                               | 62                                                                                | 0                                                                                  | 374                                                                                 | 1131                                                                                | 0                                                                                   | 0                                                                                   | 106                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | custom                                                                             | Prot                                                                                | NA                                                                                  |                                                                                     | custom                                                                              | Prot                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   |                                                                                    | 3                                                                                   | 8                                                                                   |                                                                                     |                                                                                     | 7                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              | 3                                                                                  |                                                                                     |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |
| Actuated Green, G (s)             | 16.0                                                                              | 16.0                                                                              | 150.0                                                                             | 15.0                                                                              | 15.0                                                                              | 150.0                                                                             |                                                                                    | 57.0                                                                                | 42.0                                                                                |                                                                                     |                                                                                     | 57.0                                                                                |
| Effective Green, g (s)            | 16.0                                                                              | 16.0                                                                              | 150.0                                                                             | 15.0                                                                              | 15.0                                                                              | 150.0                                                                             |                                                                                    | 57.0                                                                                | 42.0                                                                                |                                                                                     |                                                                                     | 57.0                                                                                |
| Actuated g/C Ratio                | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.10                                                                              | 0.10                                                                              | 1.00                                                                              |                                                                                    | 0.38                                                                                | 0.28                                                                                |                                                                                     |                                                                                     | 0.38                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   |                                                                                    | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 179                                                                               | 185                                                                               | 1583                                                                              | 177                                                                               | 186                                                                               | 1583                                                                              |                                                                                    | 96                                                                                  | 982                                                                                 |                                                                                     |                                                                                     | 49                                                                                  |
| v/s Ratio Prot                    | c0.07                                                                             | 0.07                                                                              |                                                                                   | 0.06                                                                              | c0.06                                                                             |                                                                                   |                                                                                    |                                                                                     | 0.32                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.18                                                                              |                                                                                   |                                                                                   | 0.04                                                                              |                                                                                    | c1.47                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.81                                                                                |
| v/c Ratio                         | 0.66                                                                              | 0.65                                                                              | 0.18                                                                              | 0.59                                                                              | 0.65                                                                              | 0.04                                                                              |                                                                                    | 3.90                                                                                | 1.15                                                                                |                                                                                     |                                                                                     | 2.16                                                                                |
| Uniform Delay, d1                 | 64.4                                                                              | 64.3                                                                              | 0.0                                                                               | 64.5                                                                              | 64.9                                                                              | 0.0                                                                               |                                                                                    | 46.5                                                                                | 54.0                                                                                |                                                                                     |                                                                                     | 46.5                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |
| Incremental Delay, d2             | 8.5                                                                               | 8.0                                                                               | 0.3                                                                               | 4.9                                                                               | 7.5                                                                               | 0.0                                                                               |                                                                                    | 1327.9                                                                              | 80.2                                                                                |                                                                                     |                                                                                     | 584.6                                                                               |
| Delay (s)                         | 72.9                                                                              | 72.4                                                                              | 0.3                                                                               | 69.5                                                                              | 72.4                                                                              | 0.0                                                                               |                                                                                    | 1374.4                                                                              | 134.2                                                                               |                                                                                     |                                                                                     | 631.1                                                                               |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 |                                                                                    | F                                                                                   | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 33.0                                                                              |                                                                                   |                                                                                   | 55.6                                                                              |                                                                                   |                                                                                    |                                                                                     | 441.8                                                                               |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 258.2                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 2.25                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 65.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/17/2015



| Movement               | SBT   | SBR   |
|------------------------|-------|-------|
| Lane Configurations    | ↑↑    | ↑     |
| Volume (vph)           | 1111  | 95    |
| Ideal Flow (vphpl)     | 1900  | 1900  |
| Total Lost time (s)    | 5.0   | 5.0   |
| Lane Util. Factor      | 0.95  | 1.00  |
| Frt                    | 1.00  | 0.85  |
| Flt Protected          | 1.00  | 1.00  |
| Satd. Flow (prot)      | 3539  | 1583  |
| Flt Permitted          | 1.00  | 1.00  |
| Satd. Flow (perm)      | 3539  | 1583  |
| Peak-hour factor, PHF  | 0.92  | 0.92  |
| Adj. Flow (vph)        | 1208  | 103   |
| RTOR Reduction (vph)   | 0     | 39    |
| Lane Group Flow (vph)  | 1208  | 64    |
| Turn Type              | NA    | pm+ov |
| Protected Phases       | 4     | 6     |
| Permitted Phases       |       | 4     |
| Actuated Green, G (s)  | 42.0  | 58.0  |
| Effective Green, g (s) | 42.0  | 58.0  |
| Actuated g/C Ratio     | 0.28  | 0.39  |
| Clearance Time (s)     | 5.0   | 5.0   |
| Vehicle Extension (s)  | 3.0   | 3.0   |
| Lane Grp Cap (vph)     | 990   | 612   |
| v/s Ratio Prot         | c0.34 | 0.01  |
| v/s Ratio Perm         |       | 0.03  |
| v/c Ratio              | 1.22  | 0.11  |
| Uniform Delay, d1      | 54.0  | 29.4  |
| Progression Factor     | 1.00  | 1.00  |
| Incremental Delay, d2  | 108.3 | 0.1   |
| Delay (s)              | 162.3 | 29.5  |
| Level of Service       | F     | C     |
| Approach Delay (s)     | 187.7 |       |
| Approach LOS           | F     |       |
| Intersection Summary   |       |       |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBU                                                                                 | SBL                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |  |                                                                                     |                                                                                     |  |
| Volume (veh/h)                    | 4                                                                                 | 1                                                                                 | 104                                                                               | 8                                                                                 | 0                                                                                 | 45                                                                                | 1                                                                                   | 118                                                                                 | 1311                                                                                | 36                                                                                  | 4                                                                                   | 51                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 4                                                                                 | 1                                                                                 | 113                                                                               | 9                                                                                 | 0                                                                                 | 49                                                                                | 0                                                                                   | 128                                                                                 | 1425                                                                                | 39                                                                                  | 0                                                                                   | 55                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.73                                                                              | 0.73                                                                              | 0.73                                                                              | 0.73                                                                              | 0.73                                                                              |                                                                                   | 0.00                                                                                | 0.73                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |
| vC, conflicting volume            | 2708                                                                              | 3410                                                                              | 796                                                                               | 2709                                                                              | 3403                                                                              | 732                                                                               | 0                                                                                   | 1591                                                                                |                                                                                     |                                                                                     | 0                                                                                   | 1464                                                                                |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2598                                                                              | 3564                                                                              | 0                                                                                 | 2599                                                                              | 3555                                                                              | 732                                                                               | 0                                                                                   | 1063                                                                                |                                                                                     |                                                                                     | 0                                                                                   | 1464                                                                                |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                                 | 4.1                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 4.1                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                                 | 2.2                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 | 2.2                                                                                 |
| p0 queue free %                   | 22                                                                                | 58                                                                                | 86                                                                                | 0                                                                                 | 100                                                                               | 87                                                                                | 0                                                                                   | 73                                                                                  |                                                                                     |                                                                                     | 0                                                                                   | 88                                                                                  |
| cM capacity (veh/h)               | 6                                                                                 | 3                                                                                 | 789                                                                               | 4                                                                                 | 3                                                                                 | 364                                                                               | 0                                                                                   | 474                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 457                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 118                                                                               | 58                                                                                | 128                                                                               | 950                                                                               | 514                                                                               | 55                                                                                | 1044                                                                                | 547                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 4                                                                                 | 9                                                                                 | 128                                                                               | 0                                                                                 | 0                                                                                 | 55                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 113                                                                               | 49                                                                                | 0                                                                                 | 0                                                                                 | 39                                                                                | 0                                                                                 | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 88                                                                                | 24                                                                                | 474                                                                               | 1700                                                                              | 1700                                                                              | 457                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.34                                                                              | 2.43                                                                              | 0.27                                                                              | 0.56                                                                              | 0.30                                                                              | 0.12                                                                              | 0.61                                                                                | 0.32                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 221                                                                               | 181                                                                               | 27                                                                                | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 298.5                                                                             | 997.4                                                                             | 15.4                                                                              | 0.0                                                                               | 0.0                                                                               | 14.0                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 298.5                                                                             | 997.4                                                                             | 1.2                                                                               |                                                                                   |                                                                                   | 0.5                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 28.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 64.3%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis 6: Broadview & Broadview Ave & Roebling St

2/17/2015



| Movement               | SBT  | SBR  |
|------------------------|------|------|
| Lane Configurations    | ↑↑   |      |
| Volume (veh/h)         | 1441 | 23   |
| Sign Control           | Free |      |
| Grade                  | 0%   |      |
| Peak Hour Factor       | 0.92 | 0.92 |
| Hourly flow rate (vph) | 1566 | 25   |
| Pedestrians            |      |      |
| Lane Width (ft)        |      |      |
| Walking Speed (ft/s)   |      |      |
| Percent Blockage       |      |      |
| Right turn flare (veh) |      |      |
| Median type            | None |      |
| Median storage (veh)   |      |      |
| Upstream signal (ft)   | 618  |      |
| pX, platoon unblocked  |      |      |
| vC, conflicting volume |      |      |
| vC1, stage 1 conf vol  |      |      |
| vC2, stage 2 conf vol  |      |      |
| vCu, unblocked vol     |      |      |
| tC, single (s)         |      |      |
| tC, 2 stage (s)        |      |      |
| tF (s)                 |      |      |
| p0 queue free %        |      |      |
| cM capacity (veh/h)    |      |      |
| Direction, Lane #      |      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Shopping Center/Chappell St

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBU                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                                | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |                                                                                    |                                                                                     |  |                                                                                     |  |  |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 4                                                                                 | 0                                                                                 | 10                                                                                 | 0                                                                                   | 1451                                                                                | 5                                                                                   | 10                                                                                  | 1521                                                                                |
| Sign Control                      | Stop                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | Stop                                                                              |                                                                                    |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0%                                                                                |                                                                                    |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 11                                                                                 | 0                                                                                   | 1577                                                                                | 5                                                                                   | 11                                                                                  | 1653                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2474                                                                              | 3258                                                                              | 827                                                                               | 0                                                                                 | 2428                                                                              | 3255                                                                              | 791                                                                                | 1653                                                                                |                                                                                     |                                                                                     | 1583                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2474                                                                              | 3258                                                                              | 827                                                                               | 0                                                                                 | 2428                                                                              | 3255                                                                              | 791                                                                                | 1653                                                                                |                                                                                     |                                                                                     | 1583                                                                                |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                                | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                                | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 100                                                                               | 0                                                                                 | 73                                                                                | 100                                                                               | 97                                                                                 | 100                                                                                 |                                                                                     |                                                                                     | 97                                                                                  |                                                                                     |
| cM capacity (veh/h)               | 14                                                                                | 9                                                                                 | 315                                                                               | 0                                                                                 | 16                                                                                | 9                                                                                 | 332                                                                                | 386                                                                                 |                                                                                     |                                                                                     | 411                                                                                 |                                                                                     |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 15                                                                                | 1051                                                                              | 531                                                                               | 11                                                                                | 827                                                                               | 827                                                                               |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 11                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 51                                                                                | 1700                                                                              | 1700                                                                              | 411                                                                               | 1700                                                                              | 1700                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.30                                                                              | 0.62                                                                              | 0.31                                                                              | 0.03                                                                              | 0.49                                                                              | 0.49                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 26                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 104.2                                                                             | 0.0                                                                               | 0.0                                                                               | 14.0                                                                              | 0.0                                                                               | 0.0                                                                               |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 104.2                                                                             | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 0.5                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 52.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Shopping Center/Chappell St

2/17/2015



| Movement               | SBR  |
|------------------------|------|
| Lane Configurations    |      |
| Volume (veh/h)         | 0    |
| Sign Control           |      |
| Grade                  |      |
| Peak Hour Factor       | 0.92 |
| Hourly flow rate (vph) | 0    |
| Pedestrians            |      |
| Lane Width (ft)        |      |
| Walking Speed (ft/s)   |      |
| Percent Blockage       |      |
| Right turn flare (veh) |      |
| Median type            |      |
| Median storage veh     |      |
| Upstream signal (ft)   |      |
| pX, platoon unblocked  |      |
| vC, conflicting volume |      |
| vC1, stage 1 conf vol  |      |
| vC2, stage 2 conf vol  |      |
| vCu, unblocked vol     |      |
| tC, single (s)         |      |
| tC, 2 stage (s)        |      |
| tF (s)                 |      |
| p0 queue free %        |      |
| cM capacity (veh/h)    |      |
| Direction, Lane #      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |
| Movement                          | WBU                                                                               | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBU                                                                               | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |  |                                                                                   |                                                                                   |  |  |
| Volume (veh/h)                    | 3                                                                                 | 9                                                                                 | 9                                                                                 | 1403                                                                              | 10                                                                                | 2                                                                                 | 4                                                                                   | 1552                                                                                |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   |                                                                                     | Free                                                                                |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |                                                                                     | 0%                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 10                                                                                | 10                                                                                | 1525                                                                              | 11                                                                                | 0                                                                                 | 4                                                                                   | 1687                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                     | None                                                                                |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.00                                                                              |                                                                                     |                                                                                     |
| vC, conflicting volume            | 0                                                                                 | 2383                                                                              | 768                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 1536                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 0                                                                                 | 2383                                                                              | 768                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 1536                                                                                |                                                                                     |
| tC, single (s)                    | 0.0                                                                               | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 0.0                                                                               | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| tF (s)                            | 0.0                                                                               | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 0.0                                                                               | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 65                                                                                | 97                                                                                |                                                                                   |                                                                                   | 0                                                                                 | 99                                                                                  |                                                                                     |
| cM capacity (veh/h)               | 0                                                                                 | 28                                                                                | 344                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 429                                                                                 |                                                                                     |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |                                                                                     |                                                                                     |
| Volume Total                      | 20                                                                                | 1017                                                                              | 519                                                                               | 4                                                                                 | 843                                                                               | 843                                                                               |                                                                                     |                                                                                     |
| Volume Left                       | 10                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                     |                                                                                     |
| Volume Right                      | 10                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                     |                                                                                     |
| cSH                               | 52                                                                                | 1700                                                                              | 1700                                                                              | 429                                                                               | 1700                                                                              | 1700                                                                              |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.37                                                                              | 0.60                                                                              | 0.31                                                                              | 0.01                                                                              | 0.50                                                                              | 0.50                                                                              |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 34                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                     |                                                                                     |
| Control Delay (s)                 | 110.5                                                                             | 0.0                                                                               | 0.0                                                                               | 13.5                                                                              | 0.0                                                                               | 0.0                                                                               |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Approach Delay (s)                | 110.5                                                                             | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 52.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                   |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/17/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBU                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |  |                                                                                     |  |  |
| Volume (veh/h)                    | 18                                                                                | 1                                                                                 | 19                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                   | 5                                                                                   | 1385                                                                                | 0                                                                                   | 0                                                                                   | 1561                                                                                |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 20                                                                                | 1                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 5                                                                                   | 1505                                                                                | 0                                                                                   | 0                                                                                   | 1697                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.00                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2473                                                                              | 3226                                                                              | 861                                                                               | 2386                                                                              | 3238                                                                              | 753                                                                               | 0                                                                                   | 1722                                                                                |                                                                                     |                                                                                     | 1505                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2473                                                                              | 3226                                                                              | 861                                                                               | 2386                                                                              | 3238                                                                              | 753                                                                               | 0                                                                                   | 1722                                                                                |                                                                                     |                                                                                     | 1505                                                                                |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 0.0                                                                                 | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 0.0                                                                                 | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 88                                                                                | 93                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 0                                                                                   | 99                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |
| cM capacity (veh/h)               | 15                                                                                | 9                                                                                 | 299                                                                               | 15                                                                                | 9                                                                                 | 352                                                                               | 0                                                                                   | 363                                                                                 |                                                                                     |                                                                                     | 441                                                                                 |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 41                                                                                | 0                                                                                 | 5                                                                                 | 1004                                                                              | 502                                                                               | 0                                                                                 | 1131                                                                                | 591                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 20                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 28                                                                                | 1700                                                                              | 363                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 1.48                                                                              | 0.00                                                                              | 0.01                                                                              | 0.59                                                                              | 0.30                                                                              | 0.00                                                                              | 0.67                                                                                | 0.35                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 122                                                                               | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 554.4                                                                             | 0.0                                                                               | 15.1                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 554.4                                                                             | 0.0                                                                               | 0.1                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 7.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 53.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis 13: Broadview Ave & Gold Cup Dr/Private Residence

2/17/2015

|                        |      |
|------------------------|------|
| Movement               | SBR  |
| Lane Configurations    |      |
| Volume (veh/h)         | 23   |
| Sign Control           |      |
| Grade                  |      |
| Peak Hour Factor       | 0.92 |
| Hourly flow rate (vph) | 25   |
| Pedestrians            |      |
| Lane Width (ft)        |      |
| Walking Speed (ft/s)   |      |
| Percent Blockage       |      |
| Right turn flare (veh) |      |
| Median type            |      |
| Median storage veh)    |      |
| Upstream signal (ft)   |      |
| pX, platoon unblocked  |      |
| vC, conflicting volume |      |
| vC1, stage 1 conf vol  |      |
| vC2, stage 2 conf vol  |      |
| vCu, unblocked vol     |      |
| tC, single (s)         |      |
| tC, 2 stage (s)        |      |
| tF (s)                 |      |
| p0 queue free %        |      |
| cM capacity (veh/h)    |      |
| Direction, Lane #      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/17/2015

|                                   |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBU                                                                               | SBL                                                                               | SBT                                                                                |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |                                                                                   |  |  |
| Volume (veh/h)                    | 3                                                                                 | 53                                                                                | 1322                                                                              | 14                                                                                | 1                                                                                 | 27                                                                                | 1568                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   |                                                                                   | Free                                                                               |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |                                                                                   | 0%                                                                                 |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               |
| Hourly flow rate (vph)            | 3                                                                                 | 58                                                                                | 1437                                                                              | 15                                                                                | 0                                                                                 | 29                                                                                | 1704                                                                               |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   | None                                                                               |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| pX, platoon unblocked             | 0.91                                                                              | 0.91                                                                              |                                                                                   |                                                                                   | 0.00                                                                              | 0.91                                                                              |                                                                                    |
| vC, conflicting volume            | 2355                                                                              | 726                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 1452                                                                              |                                                                                    |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| vCu, unblocked vol                | 2292                                                                              | 503                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 1301                                                                              |                                                                                    |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 0.0                                                                               | 4.1                                                                               |                                                                                    |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 0.0                                                                               | 2.2                                                                               |                                                                                    |
| p0 queue free %                   | 88                                                                                | 88                                                                                |                                                                                   |                                                                                   | 0                                                                                 | 94                                                                                |                                                                                    |
| cM capacity (veh/h)               | 28                                                                                | 468                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 481                                                                               |                                                                                    |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |                                                                                    |
| Volume Total                      | 61                                                                                | 958                                                                               | 494                                                                               | 29                                                                                | 852                                                                               | 852                                                                               |                                                                                    |
| Volume Left                       | 3                                                                                 | 0                                                                                 | 0                                                                                 | 29                                                                                | 0                                                                                 | 0                                                                                 |                                                                                    |
| Volume Right                      | 58                                                                                | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                    |
| cSH                               | 255                                                                               | 1700                                                                              | 1700                                                                              | 481                                                                               | 1700                                                                              | 1700                                                                              |                                                                                    |
| Volume to Capacity                | 0.24                                                                              | 0.56                                                                              | 0.29                                                                              | 0.06                                                                              | 0.50                                                                              | 0.50                                                                              |                                                                                    |
| Queue Length 95th (ft)            | 23                                                                                | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                    |
| Control Delay (s)                 | 23.5                                                                              | 0.0                                                                               | 0.0                                                                               | 13.0                                                                              | 0.0                                                                               | 0.0                                                                               |                                                                                    |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |
| Approach Delay (s)                | 23.5                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |                                                                                    |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Average Delay                     |                                                                                   |                                                                                   | 0.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 53.5%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | A                                                                                  |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBU                                                                               | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                                | NBU                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 |
| Lane Configurations               |                                                                                   |  |  |  |                                                                                   |  |  |                                                                                     |  |  |  |  |
| Volume (vph)                      | 4                                                                                 | 671                                                                               | 117                                                                               | 158                                                                               | 41                                                                                | 140                                                                               | 161                                                                                | 1                                                                                   | 221                                                                                 | 531                                                                                 | 17                                                                                  | 137                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                                |                                                                                     | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                               |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Flt                               |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                               |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                |
| Flt Protected                     |                                                                                   | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                               |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1681                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                               |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                |
| Flt Permitted                     |                                                                                   | 0.63                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                               |                                                                                     | 0.33                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1111                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                               |                                                                                     | 621                                                                                 | 3539                                                                                | 1583                                                                                | 1770                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 4                                                                                 | 729                                                                               | 127                                                                               | 172                                                                               | 45                                                                                | 152                                                                               | 175                                                                                | 1                                                                                   | 240                                                                                 | 577                                                                                 | 18                                                                                  | 149                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 141                                                                               | 0                                                                                 | 0                                                                                 | 157                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 10                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 420                                                                               | 440                                                                               | 31                                                                                | 0                                                                                 | 197                                                                               | 18                                                                                 | 0                                                                                   | 241                                                                                 | 577                                                                                 | 8                                                                                   | 149                                                                                 |
| Turn Type                         | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                               | custom                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                |
| Protected Phases                  |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                    |                                                                                     | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   |
| Permitted Phases                  | 6                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                  | 3                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |
| Actuated Green, G (s)             |                                                                                   | 21.8                                                                              | 21.8                                                                              | 21.8                                                                              |                                                                                   | 12.2                                                                              | 12.2                                                                               |                                                                                     | 12.0                                                                                | 54.7                                                                                | 54.7                                                                                | 15.3                                                                                |
| Effective Green, g (s)            |                                                                                   | 21.8                                                                              | 21.8                                                                              | 21.8                                                                              |                                                                                   | 12.2                                                                              | 12.2                                                                               |                                                                                     | 12.0                                                                                | 54.7                                                                                | 54.7                                                                                | 15.3                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.18                                                                              | 0.18                                                                              | 0.18                                                                              |                                                                                   | 0.10                                                                              | 0.10                                                                               |                                                                                     | 0.10                                                                                | 0.46                                                                                | 0.46                                                                                | 0.13                                                                                |
| Clearance Time (s)                |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                                |                                                                                     | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 201                                                                               | 310                                                                               | 287                                                                               |                                                                                   | 355                                                                               | 160                                                                                |                                                                                     | 62                                                                                  | 1613                                                                                | 721                                                                                 | 225                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   | 0.26                                                                              |                                                                                   |                                                                                   | c0.06                                                                             |                                                                                    |                                                                                     |                                                                                     | 0.16                                                                                |                                                                                     | 0.08                                                                                |
| v/s Ratio Perm                    |                                                                                   | c0.38                                                                             |                                                                                   | 0.02                                                                              |                                                                                   |                                                                                   | 0.01                                                                               |                                                                                     | c0.39                                                                               |                                                                                     | 0.01                                                                                |                                                                                     |
| v/c Ratio                         |                                                                                   | 2.09                                                                              | 1.42                                                                              | 0.11                                                                              |                                                                                   | 0.55                                                                              | 0.11                                                                               |                                                                                     | 3.89                                                                                | 0.36                                                                                | 0.01                                                                                | 0.66                                                                                |
| Uniform Delay, d1                 |                                                                                   | 49.1                                                                              | 49.1                                                                              | 41.0                                                                              |                                                                                   | 51.3                                                                              | 49.0                                                                               |                                                                                     | 54.0                                                                                | 21.2                                                                                | 17.9                                                                                | 49.9                                                                                |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                               |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 506.9                                                                             | 206.7                                                                             | 0.2                                                                               |                                                                                   | 1.9                                                                               | 0.3                                                                                |                                                                                     | 1337.2                                                                              | 0.6                                                                                 | 0.0                                                                                 | 7.1                                                                                 |
| Delay (s)                         |                                                                                   | 556.0                                                                             | 255.8                                                                             | 41.2                                                                              |                                                                                   | 53.2                                                                              | 49.3                                                                               |                                                                                     | 1391.2                                                                              | 21.8                                                                                | 17.9                                                                                | 57.0                                                                                |
| Level of Service                  |                                                                                   | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | D                                                                                 | D                                                                                  |                                                                                     | F                                                                                   | C                                                                                   | B                                                                                   | E                                                                                   |
| Approach Delay (s)                |                                                                                   |                                                                                   | 342.2                                                                             |                                                                                   |                                                                                   | 51.4                                                                              |                                                                                    |                                                                                     |                                                                                     | 416.5                                                                               |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                    |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 204.3                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | F                                                                                   |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.54                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 114.9%                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | H                                                                                   |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/17/2015



| Movement               | SBT  | SBR   |
|------------------------|------|-------|
| Lane Configurations    | ↑↑   | ↑     |
| Volume (vph)           | 528  | 983   |
| Ideal Flow (vphpl)     | 1900 | 1900  |
| Total Lost time (s)    | 4.0  | 4.0   |
| Lane Util. Factor      | 0.95 | 1.00  |
| Frt                    | 1.00 | 0.85  |
| Flt Protected          | 1.00 | 1.00  |
| Satd. Flow (prot)      | 3539 | 1583  |
| Flt Permitted          | 1.00 | 1.00  |
| Satd. Flow (perm)      | 3539 | 1583  |
| Peak-hour factor, PHF  | 0.92 | 0.92  |
| Adj. Flow (vph)        | 574  | 1068  |
| RTOR Reduction (vph)   | 0    | 263   |
| Lane Group Flow (vph)  | 574  | 805   |
| Turn Type              | NA   | Perm  |
| Protected Phases       | 4    |       |
| Permitted Phases       |      | 4     |
| Actuated Green, G (s)  | 58.0 | 58.0  |
| Effective Green, g (s) | 58.0 | 58.0  |
| Actuated g/C Ratio     | 0.48 | 0.48  |
| Clearance Time (s)     | 4.0  | 4.0   |
| Vehicle Extension (s)  | 3.0  | 3.0   |
| Lane Grp Cap (vph)     | 1710 | 765   |
| v/s Ratio Prot         | 0.16 |       |
| v/s Ratio Perm         |      | c0.51 |
| v/c Ratio              | 0.34 | 1.05  |
| Uniform Delay, d1      | 19.1 | 31.0  |
| Progression Factor     | 1.00 | 1.00  |
| Incremental Delay, d2  | 0.5  | 47.2  |
| Delay (s)              | 19.6 | 78.2  |
| Level of Service       | B    | E     |
| Approach Delay (s)     | 57.7 |       |
| Approach LOS           | E    |       |
| Intersection Summary   |      |       |

### Summary of All Intervals

| Run Number              | 24   | 25   | 26   | 27   | 28   |      | Avg  |
|-------------------------|------|------|------|------|------|------|------|
| Start Time              | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 | 6:57 |
| End Time                | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 | 7:10 |
| Total Time (min)        | 13   | 13   | 13   | 13   | 13   | 13   | 13   |
| Time Recorded (min)     | 10   | 10   | 10   | 10   | 10   | 10   | 10   |
| # of Intervals          | 2    | 2    | 2    | 2    | 2    | 2    | 2    |
| # of Recorded Intervals | 1    | 1    | 1    | 1    | 1    | 1    | 1    |
| Vehs Entered            | 796  | 757  | 754  | 771  | 804  | 783  | 777  |
| Vehs Exited             | 717  | 727  | 671  | 737  | 715  | 717  | 714  |
| Starting Vehs           | 171  | 202  | 191  | 212  | 166  | 192  | 187  |
| Ending Vehs             | 250  | 232  | 274  | 246  | 255  | 258  | 251  |
| Travel Distance (mi)    | 609  | 608  | 589  | 599  | 611  | 605  | 604  |
| Travel Time (hr)        | 38.5 | 37.7 | 38.5 | 41.7 | 37.5 | 41.3 | 39.2 |
| Total Delay (hr)        | 17.4 | 16.6 | 18.0 | 20.9 | 16.4 | 20.1 | 18.2 |
| Total Stops             | 940  | 886  | 875  | 928  | 908  | 936  | 909  |
| Fuel Used (gal)         | 24.7 | 24.1 | 23.6 | 24.8 | 24.0 | 24.8 | 24.3 |

### Interval #0 Information Seeding

|                                     |      |
|-------------------------------------|------|
| Start Time                          | 6:57 |
| End Time                            | 7:00 |
| Total Time (min)                    | 3    |
| Volumes adjusted by Growth Factors. |      |
| No data recorded this interval.     |      |

### Interval #1 Information Recording

|                                     |      |
|-------------------------------------|------|
| Start Time                          | 7:00 |
| End Time                            | 7:10 |
| Total Time (min)                    | 10   |
| Volumes adjusted by Growth Factors. |      |

| Run Number           | 24   | 25   | 26   | 27   | 28   |      | Avg  |
|----------------------|------|------|------|------|------|------|------|
| Vehs Entered         | 796  | 757  | 754  | 771  | 804  | 783  | 777  |
| Vehs Exited          | 717  | 727  | 671  | 737  | 715  | 717  | 714  |
| Starting Vehs        | 171  | 202  | 191  | 212  | 166  | 192  | 187  |
| Ending Vehs          | 250  | 232  | 274  | 246  | 255  | 258  | 251  |
| Travel Distance (mi) | 609  | 608  | 589  | 599  | 611  | 605  | 604  |
| Travel Time (hr)     | 38.5 | 37.7 | 38.5 | 41.7 | 37.5 | 41.3 | 39.2 |
| Total Delay (hr)     | 17.4 | 16.6 | 18.0 | 20.9 | 16.4 | 20.1 | 18.2 |
| Total Stops          | 940  | 886  | 875  | 928  | 908  | 936  | 909  |
| Fuel Used (gal)      | 24.7 | 24.1 | 23.6 | 24.8 | 24.0 | 24.8 | 24.3 |



# Queuing and Blocking Report

## SAT Existing

2/17/2015

### Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R   | UL  | L   | T   | TR  | UL  | T   |
| Maximum Queue (ft)    | 158 | 194 | 119 | 136 | 184 | 79  | 170 | 220 | 302 | 311 | 164 | 396 |
| Average Queue (ft)    | 83  | 153 | 55  | 81  | 118 | 41  | 121 | 151 | 212 | 224 | 125 | 316 |
| 95th Queue (ft)       | 193 | 215 | 138 | 152 | 198 | 102 | 192 | 236 | 341 | 344 | 195 | 443 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |     |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |     |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55  | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 1   |     |     | 49  | 0   |     |     | 2   |     | 9   | 29  |
| Queuing Penalty (veh) | 0   | 1   |     |     | 28  | 0   |     |     | 8   |     | 50  | 29  |

### Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 376 | 220 |
| Average Queue (ft)    | 281 | 105 |
| 95th Queue (ft)       | 428 | 264 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 19  | 0   |
| Queuing Penalty (veh) | 18  | 0   |

### Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|------|-----|-----|-----|
| Directions Served     | LTR | LTR | UL  | T    | UL  | T   | TR  |
| Maximum Queue (ft)    | 94  | 58  | 106 | 14   | 39  | 6   | 4   |
| Average Queue (ft)    | 55  | 33  | 62  | 3    | 25  | 1   | 1   |
| 95th Queue (ft)       | 96  | 72  | 130 | 28   | 53  | 12  | 7   |
| Link Distance (ft)    | 329 | 466 |     | 1229 |     | 555 | 555 |
| Upstream Blk Time (%) |     |     |     |      |     |     |     |
| Queuing Penalty (veh) |     |     |     |      |     |     |     |
| Storage Bay Dist (ft) |     |     | 210 |      | 200 |     |     |
| Storage Blk Time (%)  |     |     |     |      |     |     |     |
| Queuing Penalty (veh) |     |     |     |      |     |     |     |

Queuing and Blocking Report  
SAT Existing

2/17/2015

Intersection: 9: Brodview Ave/Broadview & Shopping Center/Chappell St

| Movement              | WB   | SB  |
|-----------------------|------|-----|
| Directions Served     | ULTR | L   |
| Maximum Queue (ft)    | 40   | 8   |
| Average Queue (ft)    | 13   | 2   |
| 95th Queue (ft)       | 42   | 13  |
| Link Distance (ft)    | 483  |     |
| Upstream Blk Time (%) |      |     |
| Queuing Penalty (veh) |      |     |
| Storage Bay Dist (ft) |      | 500 |
| Storage Blk Time (%)  |      |     |
| Queuing Penalty (veh) |      |     |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | ULR | T   | TR  | UL  |
| Maximum Queue (ft)    | 34  | 6   | 4   | 16  |
| Average Queue (ft)    | 16  | 1   | 1   | 6   |
| 95th Queue (ft)       | 43  | 12  | 7   | 25  |
| Link Distance (ft)    | 307 | 117 | 117 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LTR | UL  | TR  |
| Maximum Queue (ft)    | 89  | 16  | 13  |
| Average Queue (ft)    | 45  | 4   | 5   |
| 95th Queue (ft)       | 107 | 20  | 34  |
| Link Distance (ft)    | 266 |     | 117 |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

# Queuing and Blocking Report

## SAT Existing

2/17/2015

### Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | UL  |
| Maximum Queue (ft)    | 42  | 32  |
| Average Queue (ft)    | 28  | 12  |
| 95th Queue (ft)       | 51  | 38  |
| Link Distance (ft)    | 511 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 400 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

### Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|
| Directions Served     | UL  | LT  | R   | LT  | T   | R   | UL  | T    | T    | L   | T   | T   |
| Maximum Queue (ft)    | 725 | 717 | 490 | 167 | 124 | 37  | 309 | 221  | 201  | 158 | 161 | 168 |
| Average Queue (ft)    | 627 | 599 | 235 | 127 | 38  | 11  | 232 | 140  | 116  | 98  | 98  | 108 |
| 95th Queue (ft)       | 862 | 853 | 711 | 181 | 120 | 47  | 397 | 260  | 238  | 166 | 179 | 195 |
| Link Distance (ft)    | 794 | 794 |     | 476 | 476 | 476 |     | 1210 | 1210 |     | 896 | 896 |
| Upstream Blk Time (%) | 12  | 13  |     |     |     |     |     |      |      |     |     |     |
| Queuing Penalty (veh) | 0   | 0   |     |     |     |     |     |      |      |     |     |     |
| Storage Bay Dist (ft) |     |     | 565 |     |     |     | 581 |      |      | 400 |     |     |
| Storage Blk Time (%)  |     | 28  | 0   |     |     |     |     |      | 0    |     |     |     |
| Queuing Penalty (veh) |     | 44  | 1   |     |     |     |     |      | 0    |     |     |     |

### Network Summary

Network wide Queuing Penalty: 177

**APPENDIX J**  
**Traffic Studies –**  
**Future No-Build Operational Analyses**

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# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 149                                                                               | 73                                                                                | 295                                                                               | 85                                                                                | 104                                                                               | 35                                                                                | 294                                                                                 | 854                                                                                 | 38                                                                                  | 31                                                                                  | 573                                                                                 | 245                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                                | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 162                                                                               | 79                                                                                | 321                                                                               | 92                                                                                | 113                                                                               | 38                                                                                | 320                                                                                 | 928                                                                                 | 41                                                                                  | 34                                                                                  | 623                                                                                 | 266                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 94                                                                                  |
| Lane Group Flow (vph)             | 118                                                                               | 123                                                                               | 321                                                                               | 92                                                                                | 113                                                                               | 38                                                                                | 320                                                                                 | 967                                                                                 | 0                                                                                   | 34                                                                                  | 623                                                                                 | 172                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                                | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 16.6                                                                              | 16.6                                                                              | 150.0                                                                             | 14.4                                                                              | 14.4                                                                              | 150.0                                                                             | 19.3                                                                                | 91.6                                                                                |                                                                                     | 7.4                                                                                 | 79.7                                                                                | 96.3                                                                                |
| Effective Green, g (s)            | 16.6                                                                              | 16.6                                                                              | 150.0                                                                             | 14.4                                                                              | 14.4                                                                              | 150.0                                                                             | 19.3                                                                                | 91.6                                                                                |                                                                                     | 7.4                                                                                 | 79.7                                                                                | 96.3                                                                                |
| Actuated g/C Ratio                | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.10                                                                              | 0.10                                                                              | 1.00                                                                              | 0.13                                                                                | 0.61                                                                                |                                                                                     | 0.05                                                                                | 0.53                                                                                | 0.64                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 186                                                                               | 192                                                                               | 1583                                                                              | 169                                                                               | 178                                                                               | 1583                                                                              | 441                                                                                 | 2147                                                                                |                                                                                     | 87                                                                                  | 1880                                                                                | 1016                                                                                |
| v/s Ratio Prot                    | 0.07                                                                              | c0.07                                                                             |                                                                                   | 0.05                                                                              | c0.06                                                                             |                                                                                   | c0.09                                                                               | c0.28                                                                               |                                                                                     | 0.02                                                                                | 0.18                                                                                | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.09                                                                                |
| v/c Ratio                         | 0.63                                                                              | 0.64                                                                              | 0.20                                                                              | 0.54                                                                              | 0.63                                                                              | 0.02                                                                              | 0.73                                                                                | 0.45                                                                                |                                                                                     | 0.39                                                                                | 0.33                                                                                | 0.17                                                                                |
| Uniform Delay, d1                 | 63.8                                                                              | 63.8                                                                              | 0.0                                                                               | 64.7                                                                              | 65.3                                                                              | 0.0                                                                               | 62.8                                                                                | 15.7                                                                                |                                                                                     | 69.1                                                                                | 20.0                                                                                | 10.8                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.89                                                                                | 1.48                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 6.9                                                                               | 7.1                                                                               | 0.3                                                                               | 3.6                                                                               | 7.2                                                                               | 0.0                                                                               | 4.8                                                                                 | 0.6                                                                                 |                                                                                     | 2.9                                                                                 | 0.5                                                                                 | 0.1                                                                                 |
| Delay (s)                         | 70.7                                                                              | 71.0                                                                              | 0.3                                                                               | 68.2                                                                              | 72.5                                                                              | 0.0                                                                               | 60.9                                                                                | 23.8                                                                                |                                                                                     | 72.0                                                                                | 20.5                                                                                | 10.9                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                   | C                                                                                   |                                                                                     | E                                                                                   | C                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 30.5                                                                              |                                                                                   |                                                                                   | 59.5                                                                              |                                                                                   |                                                                                     | 33.0                                                                                |                                                                                     |                                                                                     | 19.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 30.6                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 6                                                                                 | 2                                                                                 | 104                                                                               | 7                                                                                 | 1                                                                                 | 16                                                                                | 169                                                                                 | 1109                                                                                | 11                                                                                  | 25                                                                                  | 844                                                                                 | 31                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 7                                                                                 | 2                                                                                 | 113                                                                               | 8                                                                                 | 1                                                                                 | 17                                                                                | 184                                                                                 | 1205                                                                                | 12                                                                                  | 27                                                                                  | 917                                                                                 | 34                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              |                                                                                   | 0.91                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1977                                                                              | 2573                                                                              | 476                                                                               | 2206                                                                              | 2584                                                                              | 609                                                                               | 951                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1875                                                                              | 2531                                                                              | 225                                                                               | 2127                                                                              | 2543                                                                              | 609                                                                               | 748                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 77                                                                                | 88                                                                                | 84                                                                                | 51                                                                                | 94                                                                                | 96                                                                                | 76                                                                                  |                                                                                     |                                                                                     | 95                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 29                                                                                | 18                                                                                | 708                                                                               | 16                                                                                | 18                                                                                | 438                                                                               | 779                                                                                 |                                                                                     |                                                                                     | 569                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 122                                                                               | 26                                                                                | 184                                                                               | 804                                                                               | 414                                                                               | 27                                                                                | 612                                                                                 | 339                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 7                                                                                 | 8                                                                                 | 184                                                                               | 0                                                                                 | 0                                                                                 | 27                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 113                                                                               | 17                                                                                | 0                                                                                 | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                   | 34                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 241                                                                               | 44                                                                                | 779                                                                               | 1700                                                                              | 1700                                                                              | 569                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.51                                                                              | 0.59                                                                              | 0.24                                                                              | 0.47                                                                              | 0.24                                                                              | 0.05                                                                              | 0.36                                                                                | 0.20                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 65                                                                                | 55                                                                                | 23                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 34.4                                                                              | 168.2                                                                             | 11.0                                                                              | 0.0                                                                               | 0.0                                                                               | 11.6                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | D                                                                                 | F                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 34.4                                                                              | 168.2                                                                             | 1.4                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | D                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 4.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 6                                                                                 | 1404                                                                              | 6                                                                                 | 4                                                                                 | 995                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 7                                                                                 | 1526                                                                              | 7                                                                                 | 4                                                                                 | 1082                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2079                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2079                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 95                                                                                | 98                                                                                |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |
| cM capacity (veh/h)               | 46                                                                                | 345                                                                               |                                                                                   |                                                                                   | 430                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 9                                                                                 | 1017                                                                              | 515                                                                               | 4                                                                                 | 541                                                                               | 541                                                                               |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 7                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 131                                                                               | 1700                                                                              | 1700                                                                              | 430                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.07                                                                              | 0.60                                                                              | 0.30                                                                              | 0.01                                                                              | 0.32                                                                              | 0.32                                                                              |
| Queue Length 95th (ft)            | 5                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 34.5                                                                              | 0.0                                                                               | 0.0                                                                               | 13.5                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | D                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 34.5                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | D                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.0%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 7                                                                                 | 3                                                                                 | 1450                                                                              | 18                                                                                | 8                                                                                 | 967                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 8                                                                                 | 3                                                                                 | 1576                                                                              | 20                                                                                | 9                                                                                 | 1051                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2129                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2129                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 82                                                                                | 99                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 42                                                                                | 329                                                                               |                                                                                   |                                                                                   | 407                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 1051                                                                              | 545                                                                               | 9                                                                                 | 526                                                                               | 526                                                                               |
| Volume Left                       | 8                                                                                 | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 3                                                                                 | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 56                                                                                | 1700                                                                              | 1700                                                                              | 407                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.19                                                                              | 0.62                                                                              | 0.32                                                                              | 0.02                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 16                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 83.3                                                                              | 0.0                                                                               | 0.0                                                                               | 14.0                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 83.3                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 50.7%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |



# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 27                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 13                                                                                  | 1423                                                                                | 0                                                                                   | 0                                                                                   | 974                                                                                 | 13                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 29                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 14                                                                                  | 1547                                                                                | 0                                                                                   | 0                                                                                   | 1059                                                                                | 14                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1867                                                                              | 2641                                                                              | 536                                                                               | 2130                                                                              | 2648                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1867                                                                              | 2641                                                                              | 536                                                                               | 2130                                                                              | 2648                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 33                                                                                | 100                                                                               | 95                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 98                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 44                                                                                | 22                                                                                | 489                                                                               | 26                                                                                | 22                                                                                | 341                                                                               | 646                                                                                 |                                                                                     |                                                                                     | 425                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 55                                                                                | 0                                                                                 | 14                                                                                | 1031                                                                              | 516                                                                               | 0                                                                                 | 706                                                                                 | 367                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 29                                                                                | 0                                                                                 | 14                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 14                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 77                                                                                | 1700                                                                              | 646                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.72                                                                              | 0.00                                                                              | 0.02                                                                              | 0.61                                                                              | 0.30                                                                              | 0.00                                                                              | 0.42                                                                                | 0.22                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 86                                                                                | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 128.1                                                                             | 0.0                                                                               | 10.7                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 128.1                                                                             | 0.0                                                                               | 0.1                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 2.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 49.3%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 43                                                                                | 1364                                                                              | 11                                                                                | 30                                                                                | 960                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 47                                                                                | 1483                                                                              | 12                                                                                | 33                                                                                | 1043                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.90                                                                              | 0.90                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |
| vC, conflicting volume            | 2076                                                                              | 747                                                                               |                                                                                   |                                                                                   | 1495                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1971                                                                              | 492                                                                               |                                                                                   |                                                                                   | 1324                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 90                                                                                | 90                                                                                |                                                                                   |                                                                                   | 93                                                                                |                                                                                   |
| cM capacity (veh/h)               | 46                                                                                | 469                                                                               |                                                                                   |                                                                                   | 465                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 51                                                                                | 988                                                                               | 506                                                                               | 33                                                                                | 522                                                                               | 522                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 33                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 47                                                                                | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 262                                                                               | 1700                                                                              | 1700                                                                              | 465                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.20                                                                              | 0.58                                                                              | 0.30                                                                              | 0.07                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 18                                                                                | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 22.0                                                                              | 0.0                                                                               | 0.0                                                                               | 13.3                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 22.0                                                                              | 0.0                                                                               |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.6                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 48.1%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 855                                                                               | 212                                                                               | 216                                                                               | 36                                                                                | 119                                                                               | 103                                                                               | 207                                                                                | 422                                                                                 | 32                                                                                  | 97                                                                                  | 405                                                                                 | 440                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                               | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1718                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                              | 1770                                                                               | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1718                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                              | 1770                                                                               | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 929                                                                               | 230                                                                               | 235                                                                               | 39                                                                                | 129                                                                               | 112                                                                               | 225                                                                                | 459                                                                                 | 35                                                                                  | 105                                                                                 | 440                                                                                 | 478                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 144                                                                               | 0                                                                                 | 0                                                                                 | 97                                                                                | 0                                                                                  | 0                                                                                   | 25                                                                                  | 0                                                                                   | 0                                                                                   | 354                                                                                 |
| Lane Group Flow (vph)             | 576                                                                               | 583                                                                               | 91                                                                                | 0                                                                                 | 168                                                                               | 15                                                                                | 225                                                                                | 459                                                                                 | 10                                                                                  | 105                                                                                 | 440                                                                                 | 124                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                               | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                    |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 58.2                                                                              | 58.2                                                                              | 58.2                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              | 17.0                                                                               | 41.6                                                                                | 41.6                                                                                | 14.2                                                                                | 38.8                                                                                | 38.8                                                                                |
| Effective Green, g (s)            | 58.2                                                                              | 58.2                                                                              | 58.2                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              | 17.0                                                                               | 41.6                                                                                | 41.6                                                                                | 14.2                                                                                | 38.8                                                                                | 38.8                                                                                |
| Actuated g/C Ratio                | 0.39                                                                              | 0.39                                                                              | 0.39                                                                              |                                                                                   | 0.13                                                                              | 0.13                                                                              | 0.11                                                                               | 0.28                                                                                | 0.28                                                                                | 0.09                                                                                | 0.26                                                                                | 0.26                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 652                                                                               | 666                                                                               | 614                                                                               |                                                                                   | 466                                                                               | 211                                                                               | 200                                                                                | 981                                                                                 | 439                                                                                 | 167                                                                                 | 915                                                                                 | 409                                                                                 |
| v/s Ratio Prot                    | c0.34                                                                             | 0.34                                                                              |                                                                                   |                                                                                   | c0.05                                                                             |                                                                                   | c0.13                                                                              | c0.13                                                                               |                                                                                     | 0.06                                                                                | 0.12                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                    |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.88                                                                              | 0.88                                                                              | 0.15                                                                              |                                                                                   | 0.36                                                                              | 0.07                                                                              | 1.12                                                                               | 0.47                                                                                | 0.02                                                                                | 0.63                                                                                | 0.48                                                                                | 0.30                                                                                |
| Uniform Delay, d1                 | 42.7                                                                              | 42.5                                                                              | 29.8                                                                              |                                                                                   | 59.2                                                                              | 56.9                                                                              | 66.5                                                                               | 45.0                                                                                | 39.4                                                                                | 65.4                                                                                | 47.1                                                                                | 44.7                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 0.97                                                                                | 1.23                                                                                | 4.81                                                                                |
| Incremental Delay, d2             | 13.5                                                                              | 12.3                                                                              | 0.1                                                                               |                                                                                   | 0.5                                                                               | 0.1                                                                               | 101.2                                                                              | 1.6                                                                                 | 0.1                                                                                 | 7.1                                                                                 | 1.8                                                                                 | 1.9                                                                                 |
| Delay (s)                         | 56.2                                                                              | 54.9                                                                              | 29.9                                                                              |                                                                                   | 59.7                                                                              | 57.0                                                                              | 167.8                                                                              | 46.6                                                                                | 39.5                                                                                | 70.3                                                                                | 59.5                                                                                | 217.0                                                                               |
| Level of Service                  | E                                                                                 | D                                                                                 | C                                                                                 |                                                                                   | E                                                                                 | E                                                                                 | F                                                                                  | D                                                                                   | D                                                                                   | E                                                                                   | E                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 51.2                                                                              |                                                                                   |                                                                                   | 58.6                                                                              |                                                                                   |                                                                                    | 84.2                                                                                |                                                                                     |                                                                                     | 134.2                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 83.6                                                                              |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                   |                                                                                    |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 74.1%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
AM Future No Build

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 172 | 214 | 59  | 113 | 144 | 75 | 182 | 218 | 308 | 316 | 61  | 199 |
| Average Queue (ft)    | 65  | 147 | 25  | 67  | 98  | 27 | 113 | 136 | 202 | 205 | 38  | 142 |
| 95th Queue (ft)       | 186 | 228 | 78  | 128 | 177 | 83 | 197 | 240 | 340 | 360 | 85  | 216 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  |     | 2   |     |     | 41  | 1  |     |     | 1   |     | 0   | 12  |
| Queuing Penalty (veh) |     | 2   |     |     | 14  | 1  |     |     | 4   |     | 1   | 4   |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 170 | 79  |
| Average Queue (ft)    | 105 | 45  |
| 95th Queue (ft)       | 198 | 85  |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 1   |     |
| Queuing Penalty (veh) | 1   |     |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LTR | LTR | L   | L   | TR  |
| Maximum Queue (ft)    | 92  | 38  | 84  | 35  | 15  |
| Average Queue (ft)    | 54  | 18  | 50  | 13  | 3   |
| 95th Queue (ft)       | 105 | 46  | 96  | 40  | 19  |
| Link Distance (ft)    | 329 | 466 |     |     | 555 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 210 | 200 |     |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 25  | 10  |
| Average Queue (ft)    | 8   | 2   |
| 95th Queue (ft)       | 30  | 15  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LR  | T   | TR  | L   |
| Maximum Queue (ft)    | 21  | 3   | 6   | 20  |
| Average Queue (ft)    | 8   | 1   | 1   | 6   |
| 95th Queue (ft)       | 30  | 6   | 12  | 25  |
| Link Distance (ft)    | 307 | 117 | 117 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  |
|-----------------------|-----|-----|
| Directions Served     | LTR | L   |
| Maximum Queue (ft)    | 60  | 26  |
| Average Queue (ft)    | 36  | 8   |
| 95th Queue (ft)       | 76  | 29  |
| Link Distance (ft)    | 266 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 300 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

# Queuing and Blocking Report

## AM Future No Build

2/27/2015

### Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 60  | 38  |
| Average Queue (ft)    | 29  | 14  |
| 95th Queue (ft)       | 67  | 42  |
| Link Distance (ft)    | 511 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 400 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

### Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|
| Directions Served     | L   | LT  | LT  | T   | R   | L   | T    | T    | R   | L   | T   | T   |
| Maximum Queue (ft)    | 494 | 488 | 159 | 126 | 28  | 289 | 192  | 192  | 9   | 123 | 182 | 212 |
| Average Queue (ft)    | 410 | 381 | 107 | 44  | 9   | 221 | 148  | 135  | 2   | 80  | 141 | 144 |
| 95th Queue (ft)       | 540 | 532 | 178 | 135 | 43  | 382 | 207  | 203  | 18  | 144 | 211 | 229 |
| Link Distance (ft)    | 794 | 794 | 476 | 476 | 476 |     | 1210 | 1210 |     |     | 896 | 896 |
| Upstream Blk Time (%) |     |     |     |     |     |     |      |      |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |      |      |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     |     |     | 581 |      |      | 180 | 400 |     |     |
| Storage Blk Time (%)  |     | 1   |     |     |     |     |      | 2    |     |     |     | 5   |
| Queuing Penalty (veh) |     | 1   |     |     |     |     |      | 1    |     |     |     | 22  |

### Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | SB  |
|-----------------------|-----|
| Directions Served     | R   |
| Maximum Queue (ft)    | 101 |
| Average Queue (ft)    | 47  |
| 95th Queue (ft)       | 186 |
| Link Distance (ft)    |     |
| Upstream Blk Time (%) |     |
| Queuing Penalty (veh) |     |
| Storage Bay Dist (ft) | 178 |
| Storage Blk Time (%)  | 0   |
| Queuing Penalty (veh) | 0   |

### Network Summary

Network wide Queuing Penalty: 52

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 302                                                                               | 85                                                                                | 342                                                                               | 125                                                                               | 164                                                                               | 40                                                                                | 358                                                                                 | 1386                                                                                | 34                                                                                  | 71                                                                                  | 1340                                                                                | 133                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                                | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 328                                                                               | 92                                                                                | 372                                                                               | 136                                                                               | 178                                                                               | 43                                                                                | 389                                                                                 | 1507                                                                                | 37                                                                                  | 77                                                                                  | 1457                                                                                | 145                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 33                                                                                  |
| Lane Group Flow (vph)             | 207                                                                               | 213                                                                               | 372                                                                               | 136                                                                               | 178                                                                               | 43                                                                                | 389                                                                                 | 1543                                                                                | 0                                                                                   | 77                                                                                  | 1457                                                                                | 112                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                                | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 23.6                                                                              | 23.6                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                                | 83.8                                                                                |                                                                                     | 12.4                                                                                | 72.8                                                                                | 96.4                                                                                |
| Effective Green, g (s)            | 23.6                                                                              | 23.6                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                                | 83.8                                                                                |                                                                                     | 12.4                                                                                | 72.8                                                                                | 96.4                                                                                |
| Actuated g/C Ratio                | 0.15                                                                              | 0.15                                                                              | 1.00                                                                              | 0.13                                                                              | 0.13                                                                              | 1.00                                                                              | 0.15                                                                                | 0.52                                                                                |                                                                                     | 0.08                                                                                | 0.45                                                                                | 0.60                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 247                                                                               | 253                                                                               | 1583                                                                              | 223                                                                               | 235                                                                               | 1583                                                                              | 502                                                                                 | 1846                                                                                |                                                                                     | 137                                                                                 | 1610                                                                                | 953                                                                                 |
| v/s Ratio Prot                    | 0.12                                                                              | c0.12                                                                             |                                                                                   | 0.08                                                                              | c0.10                                                                             |                                                                                   | c0.11                                                                               | c0.44                                                                               |                                                                                     | 0.04                                                                                | c0.41                                                                               | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   | 0.03                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.05                                                                                |
| v/c Ratio                         | 0.84                                                                              | 0.84                                                                              | 0.23                                                                              | 0.61                                                                              | 0.76                                                                              | 0.03                                                                              | 0.77                                                                                | 0.84                                                                                |                                                                                     | 0.56                                                                                | 0.90                                                                                | 0.12                                                                                |
| Uniform Delay, d1                 | 66.3                                                                              | 66.4                                                                              | 0.0                                                                               | 66.2                                                                              | 67.5                                                                              | 0.0                                                                               | 65.8                                                                                | 32.3                                                                                |                                                                                     | 71.2                                                                                | 40.4                                                                                | 13.6                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 21.3                                                                              | 21.6                                                                              | 0.3                                                                               | 4.7                                                                               | 13.0                                                                              | 0.0                                                                               | 7.3                                                                                 | 4.7                                                                                 |                                                                                     | 5.2                                                                                 | 8.8                                                                                 | 0.1                                                                                 |
| Delay (s)                         | 87.6                                                                              | 88.0                                                                              | 0.3                                                                               | 70.8                                                                              | 80.6                                                                              | 0.0                                                                               | 73.1                                                                                | 36.9                                                                                |                                                                                     | 76.4                                                                                | 49.2                                                                                | 13.7                                                                                |
| Level of Service                  | F                                                                                 | F                                                                                 | A                                                                                 | E                                                                                 | F                                                                                 | A                                                                                 | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                   | 67.2                                                                              |                                                                                   |                                                                                     | 44.2                                                                                |                                                                                     |                                                                                     | 47.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 47.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 83.2%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 10                                                                                | 0                                                                                 | 157                                                                               | 2                                                                                 | 0                                                                                 | 13                                                                                | 132                                                                                 | 1686                                                                                | 23                                                                                  | 32                                                                                  | 1712                                                                                | 40                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 11                                                                                | 0                                                                                 | 171                                                                               | 2                                                                                 | 0                                                                                 | 14                                                                                | 143                                                                                 | 1833                                                                                | 25                                                                                  | 35                                                                                  | 1861                                                                                | 43                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              |                                                                                   | 0.61                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3170                                                                              | 4097                                                                              | 952                                                                               | 3303                                                                              | 4106                                                                              | 929                                                                               | 1904                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3278                                                                              | 4800                                                                              | 0                                                                                 | 3497                                                                              | 4815                                                                              | 929                                                                               | 1202                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 74                                                                                | 0                                                                                 | 100                                                                               | 95                                                                                | 59                                                                                  |                                                                                     |                                                                                     | 89                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 661                                                                               | 1                                                                                 | 0                                                                                 | 269                                                                               | 351                                                                                 |                                                                                     |                                                                                     | 322                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 182                                                                               | 16                                                                                | 143                                                                               | 1222                                                                              | 636                                                                               | 35                                                                                | 1241                                                                                | 664                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 11                                                                                | 2                                                                                 | 143                                                                               | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 171                                                                               | 14                                                                                | 0                                                                                 | 0                                                                                 | 25                                                                                | 0                                                                                 | 0                                                                                   | 43                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 21                                                                                | 5                                                                                 | 351                                                                               | 1700                                                                              | 1700                                                                              | 322                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 8.66                                                                              | 3.26                                                                              | 0.41                                                                              | 0.72                                                                              | 0.37                                                                              | 0.11                                                                              | 0.73                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | Err                                                                               | 48                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | Err                                                                               | 22.2                                                                              | 0.0                                                                               | 0.0                                                                               | 17.5                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | Err                                                                               | 1.6                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 478.9                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 77.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 8                                                                                 | 1674                                                                              | 5                                                                                 | 7                                                                                 | 1849                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 9                                                                                 | 1820                                                                              | 5                                                                                 | 8                                                                                 | 2010                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2842                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2842                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 84                                                                                | 97                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 13                                                                                | 276                                                                               |                                                                                   |                                                                                   | 331                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 1213                                                                              | 612                                                                               | 8                                                                                 | 1005                                                                              | 1005                                                                              |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 9                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 56                                                                                | 1700                                                                              | 1700                                                                              | 331                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.19                                                                              | 0.71                                                                              | 0.36                                                                              | 0.02                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 16                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 84.2                                                                              | 0.0                                                                               | 0.0                                                                               | 16.1                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 84.2                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.1%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 23                                                                                | 14                                                                                | 1649                                                                              | 18                                                                                | 9                                                                                 | 1885                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 25                                                                                | 15                                                                                | 1792                                                                              | 20                                                                                | 10                                                                                | 2049                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2846                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2846                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 0                                                                                 | 95                                                                                |                                                                                   |                                                                                   | 97                                                                                |                                                                                   |
| cM capacity (veh/h)               | 13                                                                                | 279                                                                               |                                                                                   |                                                                                   | 335                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 40                                                                                | 1195                                                                              | 617                                                                               | 10                                                                                | 1024                                                                              | 1024                                                                              |
| Volume Left                       | 25                                                                                | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 15                                                                                | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 21                                                                                | 1700                                                                              | 1700                                                                              | 335                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 1.95                                                                              | 0.70                                                                              | 0.36                                                                              | 0.03                                                                              | 0.60                                                                              | 0.60                                                                              |
| Queue Length 95th (ft)            | 132                                                                               | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 838.4                                                                             | 0.0                                                                               | 0.0                                                                               | 16.1                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 838.4                                                                             | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 8.7                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.1%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 10                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 27                                                                                  | 1639                                                                                | 0                                                                                   | 0                                                                                   | 1907                                                                                | 57                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 11                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 29                                                                                  | 1782                                                                                | 0                                                                                   | 0                                                                                   | 2073                                                                                | 62                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3054                                                                              | 3944                                                                              | 1067                                                                              | 2903                                                                              | 3975                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3054                                                                              | 3944                                                                              | 1067                                                                              | 2903                                                                              | 3975                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 88                                                                                | 100                                                                               | 58                                                                                | 100                                                                               | 88                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 3                                                                                 | 3                                                                                 | 218                                                                               | 6                                                                                 | 3                                                                                 | 286                                                                               | 250                                                                                 |                                                                                     |                                                                                     | 344                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 37                                                                                | 1                                                                                 | 29                                                                                | 1188                                                                              | 594                                                                               | 0                                                                                 | 1382                                                                                | 753                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 11                                                                                | 0                                                                                 | 29                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 62                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 11                                                                                | 3                                                                                 | 250                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 3.40                                                                              | 0.42                                                                              | 0.12                                                                              | 0.70                                                                              | 0.35                                                                              | 0.00                                                                              | 0.81                                                                                | 0.44                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | 14                                                                                | 10                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | 1789.0                                                                            | 21.3                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | 1789.0                                                                            | 0.3                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 93.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 69.9%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |                                                                                       |  |                                                                                       |                                                                                       |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                                                                                                                    | NBR                                                                               | SBL                                                                                                                                                                    | SBT                                                                                                                                                                    |
| Lane Configurations               |  |                                                                                   | <br> |                                                                                   | <br> | <br> |
| Volume (veh/h)                    | 4                                                                                 | 66                                                                                | 1553                                                                                                                                                                   | 10                                                                                | 35                                                                                                                                                                     | 1972                                                                                                                                                                   |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                                                                                                                   |                                                                                   | Free                                                                                                                                                                   | Free                                                                                                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                                                                                                     |                                                                                   |                                                                                                                                                                        | 0%                                                                                                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                                                                                                   | 0.92                                                                              | 0.92                                                                                                                                                                   | 0.92                                                                                                                                                                   |
| Hourly flow rate (vph)            | 4                                                                                 | 72                                                                                | 1688                                                                                                                                                                   | 11                                                                                | 38                                                                                                                                                                     | 2143                                                                                                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Median type                       |                                                                                   |                                                                                   | None                                                                                                                                                                   |                                                                                   | None                                                                                                                                                                   |                                                                                                                                                                        |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                                                                                                                    |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| pX, platoon unblocked             | 0.85                                                                              | 0.85                                                                              |                                                                                                                                                                        |                                                                                   | 0.85                                                                                                                                                                   |                                                                                                                                                                        |
| vC, conflicting volume            | 2841                                                                              | 849                                                                               |                                                                                                                                                                        |                                                                                   | 1699                                                                                                                                                                   |                                                                                                                                                                        |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| vCu, unblocked vol                | 2813                                                                              | 472                                                                               |                                                                                                                                                                        |                                                                                   | 1471                                                                                                                                                                   |                                                                                                                                                                        |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                                                                                                        |                                                                                   | 4.1                                                                                                                                                                    |                                                                                                                                                                        |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                                                                                                        |                                                                                   | 2.2                                                                                                                                                                    |                                                                                                                                                                        |
| p0 queue free %                   | 60                                                                                | 84                                                                                |                                                                                                                                                                        |                                                                                   | 90                                                                                                                                                                     |                                                                                                                                                                        |
| cM capacity (veh/h)               | 11                                                                                | 458                                                                               |                                                                                                                                                                        |                                                                                   | 387                                                                                                                                                                    |                                                                                                                                                                        |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                                                                                                                   | SB 1                                                                              | SB 2                                                                                                                                                                   | SB 3                                                                                                                                                                   |
| Volume Total                      | 76                                                                                | 1125                                                                              | 574                                                                                                                                                                    | 38                                                                                | 1072                                                                                                                                                                   | 1072                                                                                                                                                                   |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                                                                                                      | 38                                                                                | 0                                                                                                                                                                      | 0                                                                                                                                                                      |
| Volume Right                      | 72                                                                                | 0                                                                                 | 11                                                                                                                                                                     | 0                                                                                 | 0                                                                                                                                                                      | 0                                                                                                                                                                      |
| cSH                               | 138                                                                               | 1700                                                                              | 1700                                                                                                                                                                   | 387                                                                               | 1700                                                                                                                                                                   | 1700                                                                                                                                                                   |
| Volume to Capacity                | 0.55                                                                              | 0.66                                                                              | 0.34                                                                                                                                                                   | 0.10                                                                              | 0.63                                                                                                                                                                   | 0.63                                                                                                                                                                   |
| Queue Length 95th (ft)            | 68                                                                                | 0                                                                                 | 0                                                                                                                                                                      | 8                                                                                 | 0                                                                                                                                                                      | 0                                                                                                                                                                      |
| Control Delay (s)                 | 59.4                                                                              | 0.0                                                                               | 0.0                                                                                                                                                                    | 15.3                                                                              | 0.0                                                                                                                                                                    | 0.0                                                                                                                                                                    |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                                                                                                        | C                                                                                 |                                                                                                                                                                        |                                                                                                                                                                        |
| Approach Delay (s)                | 59.4                                                                              | 0.0                                                                               |                                                                                                                                                                        | 0.3                                                                               |                                                                                                                                                                        |                                                                                                                                                                        |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Average Delay                     |                                                                                   | 1.3                                                                               |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |
| Intersection Capacity Utilization |                                                                                   | 65.5%                                                                             |                                                                                                                                                                        | ICU Level of Service                                                              |                                                                                                                                                                        | C                                                                                                                                                                      |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                                                                                                        |                                                                                   |                                                                                                                                                                        |                                                                                                                                                                        |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |    |  |  |  |  |  |
| Volume (vph)                      | 657                                                                               | 140                                                                               | 91                                                                                | 82                                                                                | 372                                                                               | 145                                                                               | 404                                                                                 | 701                                                                                 | 32                                                                                  | 90                                                                                  | 721                                                                                 | 1139                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 714                                                                               | 152                                                                               | 99                                                                                | 89                                                                                | 404                                                                               | 158                                                                               | 439                                                                                 | 762                                                                                 | 35                                                                                  | 98                                                                                  | 784                                                                                 | 1238                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 77                                                                                | 0                                                                                 | 0                                                                                 | 136                                                                               | 0                                                                                   | 0                                                                                   | 19                                                                                  | 0                                                                                   | 0                                                                                   | 300                                                                                 |
| Lane Group Flow (vph)             | 428                                                                               | 438                                                                               | 22                                                                                | 0                                                                                 | 493                                                                               | 22                                                                                | 439                                                                                 | 762                                                                                 | 16                                                                                  | 98                                                                                  | 784                                                                                 | 938                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 36.0                                                                              | 36.0                                                                              | 36.0                                                                              |                                                                                   | 22.0                                                                              | 22.0                                                                              | 20.0                                                                                | 71.8                                                                                | 71.8                                                                                | 14.2                                                                                | 66.0                                                                                | 66.0                                                                                |
| Effective Green, g (s)            | 36.0                                                                              | 36.0                                                                              | 36.0                                                                              |                                                                                   | 22.0                                                                              | 22.0                                                                              | 20.0                                                                                | 71.8                                                                                | 71.8                                                                                | 14.2                                                                                | 66.0                                                                                | 66.0                                                                                |
| Actuated g/C Ratio                | 0.22                                                                              | 0.22                                                                              | 0.22                                                                              |                                                                                   | 0.14                                                                              | 0.14                                                                              | 0.12                                                                                | 0.45                                                                                | 0.45                                                                                | 0.09                                                                                | 0.41                                                                                | 0.41                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 378                                                                               | 385                                                                               | 356                                                                               |                                                                                   | 482                                                                               | 217                                                                               | 221                                                                                 | 1588                                                                                | 710                                                                                 | 157                                                                                 | 1459                                                                                | 652                                                                                 |
| v/s Ratio Prot                    | 0.25                                                                              | c0.26                                                                             |                                                                                   |                                                                                   | c0.14                                                                             |                                                                                   | c0.25                                                                               | 0.22                                                                                |                                                                                     | 0.06                                                                                | 0.22                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | c0.59                                                                               |
| v/c Ratio                         | 1.13                                                                              | 1.14                                                                              | 0.06                                                                              |                                                                                   | 1.02                                                                              | 0.10                                                                              | 1.99                                                                                | 0.48                                                                                | 0.02                                                                                | 0.62                                                                                | 0.54                                                                                | 1.44                                                                                |
| Uniform Delay, d1                 | 62.0                                                                              | 62.0                                                                              | 48.7                                                                              |                                                                                   | 69.0                                                                              | 60.3                                                                              | 70.0                                                                                | 31.0                                                                                | 24.6                                                                                | 70.3                                                                                | 35.5                                                                                | 47.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 87.3                                                                              | 88.9                                                                              | 0.1                                                                               |                                                                                   | 46.9                                                                              | 0.2                                                                               | 459.7                                                                               | 0.2                                                                                 | 0.0                                                                                 | 7.5                                                                                 | 0.4                                                                                 | 205.9                                                                               |
| Delay (s)                         | 149.3                                                                             | 150.9                                                                             | 48.8                                                                              |                                                                                   | 115.9                                                                             | 60.5                                                                              | 529.7                                                                               | 31.2                                                                                | 24.6                                                                                | 77.8                                                                                | 35.9                                                                                | 252.9                                                                               |
| Level of Service                  | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | F                                                                                 | E                                                                                 | F                                                                                   | C                                                                                   | C                                                                                   | E                                                                                   | D                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 139.7                                                                             |                                                                                   |                                                                                   | 102.5                                                                             |                                                                                   |                                                                                     | 208.1                                                                               |                                                                                     |                                                                                     | 164.6                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 162.4                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.37                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 119.6%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
PM Future No Build

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 222 | 341 | 206 | 202 | 234 | 72 | 243 | 324 | 491 | 500 | 164 | 632 |
| Average Queue (ft)    | 195 | 271 | 137 | 139 | 150 | 26 | 145 | 237 | 395 | 410 | 101 | 508 |
| 95th Queue (ft)       | 245 | 379 | 274 | 217 | 258 | 85 | 269 | 391 | 576 | 571 | 194 | 721 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     | 1   | 1   |     | 8   |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     | 6   | 8   |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 3   | 29  |     |     | 56  | 0  | 0   | 0   | 15  |     | 1   | 49  |
| Queuing Penalty (veh) | 6   | 44  |     |     | 22  | 0  | 0   | 1   | 54  |     | 8   | 35  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 607 | 220 |
| Average Queue (ft)    | 481 | 89  |
| 95th Queue (ft)       | 710 | 255 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 5   |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 37  | 0   |
| Queuing Penalty (veh) | 49  | 0   |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | NB   | SB  | SB  |
|-----------------------|-----|-----|-----|------|------|-----|-----|
| Directions Served     | LTR | LTR | L   | T    | TR   | L   | TR  |
| Maximum Queue (ft)    | 258 | 34  | 124 | 48   | 52   | 45  | 8   |
| Average Queue (ft)    | 147 | 20  | 72  | 12   | 14   | 25  | 2   |
| 95th Queue (ft)       | 310 | 42  | 143 | 91   | 95   | 52  | 11  |
| Link Distance (ft)    | 329 | 466 |     | 1235 | 1235 |     | 555 |
| Upstream Blk Time (%) | 1   |     |     |      |      |     |     |
| Queuing Penalty (veh) | 0   |     |     |      |      |     |     |
| Storage Bay Dist (ft) |     |     | 210 |      |      | 200 |     |
| Storage Blk Time (%)  |     |     |     | 0    |      |     |     |
| Queuing Penalty (veh) |     |     |     | 1    |      |     |     |

Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 24  | 26  |
| Average Queue (ft)    | 8   | 7   |
| 95th Queue (ft)       | 29  | 27  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LR  | T   | TR  | L   |
| Maximum Queue (ft)    | 84  | 19  | 4   | 21  |
| Average Queue (ft)    | 43  | 6   | 1   | 7   |
| 95th Queue (ft)       | 119 | 33  | 8   | 28  |
| Link Distance (ft)    | 307 | 117 | 117 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LTR | L   | T   | TR  |
| Maximum Queue (ft)    | 89  | 49  | 18  | 12  |
| Average Queue (ft)    | 55  | 27  | 4   | 2   |
| 95th Queue (ft)       | 137 | 58  | 25  | 20  |
| Link Distance (ft)    | 266 |     | 117 | 117 |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |     |
| Storage Blk Time (%)  |     |     | 0   |     |
| Queuing Penalty (veh) |     |     | 0   |     |

Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LR  | T   | L   | T   | T   |
| Maximum Queue (ft)    | 60  | 8   | 35  | 146 | 291 |
| Average Queue (ft)    | 43  | 2   | 20  | 40  | 93  |
| 95th Queue (ft)       | 74  | 15  | 46  | 205 | 405 |
| Link Distance (ft)    | 511 | 896 |     | 750 | 750 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 400 |     |     |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | WB  | WB  | WB  | NB  | NB  | NB  | NB  | SB  | SB  | SB   |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Directions Served     | L   | LT  | LT  | T   | R   | L   | T   | T   | R   | L   | T   | T    |
| Maximum Queue (ft)    | 344 | 330 | 306 | 240 | 66  | 563 | 721 | 608 | 111 | 111 | 415 | 841  |
| Average Queue (ft)    | 298 | 277 | 239 | 177 | 24  | 455 | 406 | 322 | 22  | 65  | 257 | 578  |
| 95th Queue (ft)       | 412 | 402 | 333 | 272 | 90  | 681 | 898 | 760 | 123 | 132 | 468 | 1010 |
| Link Distance (ft)    | 794 | 794 | 477 | 477 | 477 |     | 844 | 844 |     |     | 896 | 896  |
| Upstream Blk Time (%) |     |     |     |     |     |     | 7   | 0   |     |     |     | 3    |
| Queuing Penalty (veh) |     |     |     |     |     |     | 0   | 0   |     |     |     | 25   |
| Storage Bay Dist (ft) |     |     |     |     |     | 581 |     |     | 180 | 400 |     |      |
| Storage Blk Time (%)  |     |     |     |     |     | 23  | 0   | 11  |     |     | 1   | 7    |
| Queuing Penalty (veh) |     |     |     |     |     | 79  | 0   | 3   |     |     | 1   | 81   |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | SB  |
|-----------------------|-----|
| Directions Served     | R   |
| Maximum Queue (ft)    | 203 |
| Average Queue (ft)    | 193 |
| 95th Queue (ft)       | 254 |
| Link Distance (ft)    |     |
| Upstream Blk Time (%) |     |
| Queuing Penalty (veh) |     |
| Storage Bay Dist (ft) | 178 |
| Storage Blk Time (%)  | 30  |
| Queuing Penalty (veh) | 110 |

Network Summary

Network wide Queuing Penalty: 533



# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 183                                                                               | 80                                                                                | 319                                                                               | 115                                                                               | 132                                                                               | 68                                                                                | 404                                                                                | 1182                                                                                | 68                                                                                  | 97                                                                                  | 1332                                                                                | 114                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 199                                                                               | 87                                                                                | 347                                                                               | 125                                                                               | 143                                                                               | 74                                                                                | 439                                                                                | 1285                                                                                | 74                                                                                  | 105                                                                                 | 1448                                                                                | 124                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 26                                                                                  |
| Lane Group Flow (vph)             | 141                                                                               | 145                                                                               | 347                                                                               | 125                                                                               | 143                                                                               | 74                                                                                | 439                                                                                | 1357                                                                                | 0                                                                                   | 105                                                                                 | 1448                                                                                | 98                                                                                  |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 18.2                                                                              | 18.2                                                                              | 150.0                                                                             | 16.8                                                                              | 16.8                                                                              | 150.0                                                                             | 24.4                                                                               | 80.8                                                                                |                                                                                     | 14.2                                                                                | 70.6                                                                                | 88.8                                                                                |
| Effective Green, g (s)            | 18.2                                                                              | 18.2                                                                              | 150.0                                                                             | 16.8                                                                              | 16.8                                                                              | 150.0                                                                             | 24.4                                                                               | 80.8                                                                                |                                                                                     | 14.2                                                                                | 70.6                                                                                | 88.8                                                                                |
| Actuated g/C Ratio                | 0.12                                                                              | 0.12                                                                              | 1.00                                                                              | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.16                                                                               | 0.54                                                                                |                                                                                     | 0.09                                                                                | 0.47                                                                                | 0.59                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 203                                                                               | 210                                                                               | 1583                                                                              | 198                                                                               | 208                                                                               | 1583                                                                              | 558                                                                                | 1890                                                                                |                                                                                     | 167                                                                                 | 1665                                                                                | 937                                                                                 |
| v/s Ratio Prot                    | c0.08                                                                             | 0.08                                                                              |                                                                                   | 0.07                                                                              | c0.08                                                                             |                                                                                   | c0.13                                                                              | 0.39                                                                                |                                                                                     | 0.06                                                                                | c0.41                                                                               | 0.01                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.05                                                                                |
| v/c Ratio                         | 0.69                                                                              | 0.69                                                                              | 0.22                                                                              | 0.63                                                                              | 0.69                                                                              | 0.05                                                                              | 0.79                                                                               | 0.72                                                                                |                                                                                     | 0.63                                                                                | 0.87                                                                                | 0.10                                                                                |
| Uniform Delay, d1                 | 63.2                                                                              | 63.2                                                                              | 0.0                                                                               | 63.6                                                                              | 64.1                                                                              | 0.0                                                                               | 60.3                                                                               | 26.0                                                                                |                                                                                     | 65.4                                                                                | 35.6                                                                                | 13.3                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 9.9                                                                               | 9.4                                                                               | 0.3                                                                               | 6.4                                                                               | 9.1                                                                               | 0.1                                                                               | 7.2                                                                                | 2.4                                                                                 |                                                                                     | 7.2                                                                                 | 6.5                                                                                 | 0.0                                                                                 |
| Delay (s)                         | 73.1                                                                              | 72.6                                                                              | 0.3                                                                               | 70.1                                                                              | 73.2                                                                              | 0.1                                                                               | 67.5                                                                               | 28.4                                                                                |                                                                                     | 72.6                                                                                | 42.1                                                                                | 13.4                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                  | C                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 33.1                                                                              |                                                                                   |                                                                                   | 56.2                                                                              |                                                                                   |                                                                                    | 38.0                                                                                |                                                                                     |                                                                                     | 41.9                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 40.1                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 79.1%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 5                                                                                 | 1                                                                                 | 125                                                                               | 8                                                                                 | 0                                                                                 | 45                                                                                | 141                                                                                 | 1572                                                                                | 36                                                                                  | 51                                                                                  | 1728                                                                                | 28                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 5                                                                                 | 1                                                                                 | 136                                                                               | 9                                                                                 | 0                                                                                 | 49                                                                                | 153                                                                                 | 1709                                                                                | 39                                                                                  | 55                                                                                  | 1878                                                                                | 30                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              |                                                                                   | 0.62                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3214                                                                              | 4059                                                                              | 954                                                                               | 3221                                                                              | 4054                                                                              | 874                                                                               | 1909                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3343                                                                              | 4698                                                                              | 0                                                                                 | 3355                                                                              | 4691                                                                              | 874                                                                               | 1250                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 0                                                                                 | 80                                                                                | 0                                                                                 | 100                                                                               | 83                                                                                | 56                                                                                  |                                                                                     |                                                                                     | 84                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 676                                                                               | 0                                                                                 | 0                                                                                 | 293                                                                               | 345                                                                                 |                                                                                     |                                                                                     | 355                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 142                                                                               | 58                                                                                | 153                                                                               | 1139                                                                              | 609                                                                               | 55                                                                                | 1252                                                                                | 657                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 5                                                                                 | 9                                                                                 | 153                                                                               | 0                                                                                 | 0                                                                                 | 55                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 136                                                                               | 49                                                                                | 0                                                                                 | 0                                                                                 | 39                                                                                | 0                                                                                 | 0                                                                                   | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 14                                                                                | 0                                                                                 | 345                                                                               | 1700                                                                              | 1700                                                                              | 355                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 9.91                                                                              | Err                                                                               | 0.44                                                                              | 0.67                                                                              | 0.36                                                                              | 0.16                                                                              | 0.74                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | Err                                                                               | 55                                                                                | 0                                                                                 | 0                                                                                 | 14                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | Err                                                                               | 23.6                                                                              | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | Err                                                                               | 1.9                                                                               |                                                                                   |                                                                                   | 0.5                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | Err                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.1%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 10                                                                                | 1740                                                                              | 5                                                                                 | 10                                                                                | 1823                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 11                                                                                | 1891                                                                              | 5                                                                                 | 11                                                                                | 1982                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2907                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2907                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 63                                                                                | 96                                                                                |                                                                                   |                                                                                   | 97                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 261                                                                               |                                                                                   |                                                                                   | 311                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 15                                                                                | 1261                                                                              | 636                                                                               | 11                                                                                | 991                                                                               | 991                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 11                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 37                                                                                | 1700                                                                              | 1700                                                                              | 311                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.41                                                                              | 0.74                                                                              | 0.37                                                                              | 0.03                                                                              | 0.58                                                                              | 0.58                                                                              |
| Queue Length 95th (ft)            | 34                                                                                | 0                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 156.0                                                                             | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 156.0                                                                             | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.7                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 60.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 9                                                                                 | 9                                                                                 | 1666                                                                              | 10                                                                                | 4                                                                                 | 1861                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 10                                                                                | 10                                                                                | 1811                                                                              | 11                                                                                | 4                                                                                 | 2023                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2836                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2836                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 28                                                                                | 96                                                                                |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |
| cM capacity (veh/h)               | 14                                                                                | 277                                                                               |                                                                                   |                                                                                   | 332                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 20                                                                                | 1207                                                                              | 614                                                                               | 4                                                                                 | 1011                                                                              | 1011                                                                              |
| Volume Left                       | 10                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 10                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 26                                                                                | 1700                                                                              | 1700                                                                              | 332                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.75                                                                              | 0.71                                                                              | 0.36                                                                              | 0.01                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 58                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 311.6                                                                             | 0.0                                                                               | 0.0                                                                               | 16.0                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 311.6                                                                             | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.6                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 18                                                                                | 1                                                                                 | 19                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                   | 1656                                                                                | 0                                                                                   | 0                                                                                   | 1870                                                                                | 23                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 20                                                                                | 1                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                   | 1800                                                                                | 0                                                                                   | 0                                                                                   | 2033                                                                                | 25                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2956                                                                              | 3856                                                                              | 1029                                                                              | 2848                                                                              | 3868                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 2956                                                                              | 3856                                                                              | 1029                                                                              | 2848                                                                              | 3868                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 69                                                                                | 91                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 98                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 6                                                                                 | 3                                                                                 | 231                                                                               | 5                                                                                 | 3                                                                                 | 282                                                                               | 269                                                                                 |                                                                                     |                                                                                     | 339                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 41                                                                                | 0                                                                                 | 5                                                                                 | 1200                                                                              | 600                                                                               | 0                                                                                 | 1355                                                                                | 703                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 20                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 12                                                                                | 1700                                                                              | 269                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 3.50                                                                              | 0.00                                                                              | 0.02                                                                              | 0.71                                                                              | 0.35                                                                              | 0.00                                                                              | 0.80                                                                                | 0.41                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | 0.0                                                                               | 18.7                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | 0.0                                                                               | 0.1                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 105.8                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.4%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 3                                                                                 | 53                                                                                | 1585                                                                              | 14                                                                                | 27                                                                                | 1975                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 3                                                                                 | 58                                                                                | 1723                                                                              | 15                                                                                | 29                                                                                | 2147                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              |                                                                                   |                                                                                   | 0.87                                                                              |                                                                                   |
| vC, conflicting volume            | 2862                                                                              | 869                                                                               |                                                                                   |                                                                                   | 1738                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2843                                                                              | 564                                                                               |                                                                                   |                                                                                   | 1558                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 70                                                                                | 86                                                                                |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |
| cM capacity (veh/h)               | 11                                                                                | 410                                                                               |                                                                                   |                                                                                   | 368                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 61                                                                                | 1149                                                                              | 589                                                                               | 29                                                                                | 1073                                                                              | 1073                                                                              |
| Volume Left                       | 3                                                                                 | 0                                                                                 | 0                                                                                 | 29                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 58                                                                                | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 139                                                                               | 1700                                                                              | 1700                                                                              | 368                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.44                                                                              | 0.68                                                                              | 0.35                                                                              | 0.08                                                                              | 0.63                                                                              | 0.63                                                                              |
| Queue Length 95th (ft)            | 49                                                                                | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 49.5                                                                              | 0.0                                                                               | 0.0                                                                               | 15.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 49.5                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 64.7%                                                                             |                                                                                   | ICU Level of Service                                                              | C                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |    |  |  |  |  |  |
| Volume (vph)                      | 804                                                                               | 140                                                                               | 189                                                                               | 49                                                                                | 168                                                                               | 193                                                                               | 265                                                                                 | 637                                                                                 | 20                                                                                  | 164                                                                                 | 633                                                                                 | 1178                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt Protected                     | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3500                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3500                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 874                                                                               | 152                                                                               | 205                                                                               | 53                                                                                | 183                                                                               | 210                                                                               | 288                                                                                 | 692                                                                                 | 22                                                                                  | 178                                                                                 | 688                                                                                 | 1280                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 170                                                                               | 0                                                                                 | 0                                                                                 | 187                                                                               | 0                                                                                   | 0                                                                                   | 12                                                                                  | 0                                                                                   | 0                                                                                   | 256                                                                                 |
| Lane Group Flow (vph)             | 507                                                                               | 519                                                                               | 35                                                                                | 0                                                                                 | 236                                                                               | 23                                                                                | 288                                                                                 | 692                                                                                 | 10                                                                                  | 178                                                                                 | 688                                                                                 | 1024                                                                                |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 20.7                                                                              | 20.7                                                                              | 20.7                                                                              |                                                                                   | 13.3                                                                              | 13.3                                                                              | 12.0                                                                                | 52.8                                                                                | 52.8                                                                                | 17.2                                                                                | 58.0                                                                                | 58.0                                                                                |
| Effective Green, g (s)            | 20.7                                                                              | 20.7                                                                              | 20.7                                                                              |                                                                                   | 13.3                                                                              | 13.3                                                                              | 12.0                                                                                | 52.8                                                                                | 52.8                                                                                | 17.2                                                                                | 58.0                                                                                | 58.0                                                                                |
| Actuated g/C Ratio                | 0.17                                                                              | 0.17                                                                              | 0.17                                                                              |                                                                                   | 0.11                                                                              | 0.11                                                                              | 0.10                                                                                | 0.44                                                                                | 0.44                                                                                | 0.14                                                                                | 0.48                                                                                | 0.48                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 289                                                                               | 294                                                                               | 273                                                                               |                                                                                   | 387                                                                               | 175                                                                               | 177                                                                                 | 1557                                                                                | 696                                                                                 | 253                                                                                 | 1710                                                                                | 765                                                                                 |
| v/s Ratio Prot                    | 0.30                                                                              | c0.30                                                                             |                                                                                   |                                                                                   | c0.07                                                                             |                                                                                   | c0.16                                                                               | 0.20                                                                                |                                                                                     | 0.10                                                                                | 0.19                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | c0.65                                                                               |
| v/c Ratio                         | 1.75                                                                              | 1.77                                                                              | 0.13                                                                              |                                                                                   | 0.61                                                                              | 0.13                                                                              | 1.63                                                                                | 0.44                                                                                | 0.01                                                                                | 0.70                                                                                | 0.40                                                                                | 1.34                                                                                |
| Uniform Delay, d1                 | 49.6                                                                              | 49.6                                                                              | 42.0                                                                              |                                                                                   | 50.9                                                                              | 48.1                                                                              | 54.0                                                                                | 23.4                                                                                | 18.9                                                                                | 49.0                                                                                | 19.9                                                                                | 31.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 353.4                                                                             | 358.0                                                                             | 0.2                                                                               |                                                                                   | 2.7                                                                               | 0.3                                                                               | 306.5                                                                               | 0.9                                                                                 | 0.0                                                                                 | 8.6                                                                                 | 0.7                                                                                 | 161.3                                                                               |
| Delay (s)                         | 403.0                                                                             | 407.6                                                                             | 42.2                                                                              |                                                                                   | 53.6                                                                              | 48.5                                                                              | 360.5                                                                               | 24.3                                                                                | 19.0                                                                                | 57.5                                                                                | 20.6                                                                                | 192.3                                                                               |
| Level of Service                  | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | D                                                                                 | D                                                                                 | F                                                                                   | C                                                                                   | B                                                                                   | E                                                                                   | C                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 344.9                                                                             |                                                                                   |                                                                                   | 51.2                                                                              |                                                                                   |                                                                                     | 120.8                                                                               |                                                                                     |                                                                                     | 126.1                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 173.9                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.36                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 104.3%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
SAT Future No Build

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 188 | 246 | 160 | 148 | 207 | 74 | 176 | 238 | 349 | 366 | 155 | 641 |
| Average Queue (ft)    | 110 | 182 | 90  | 93  | 137 | 35 | 128 | 169 | 258 | 274 | 109 | 554 |
| 95th Queue (ft)       | 224 | 259 | 193 | 157 | 235 | 88 | 212 | 282 | 393 | 409 | 188 | 743 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     |     |     |     | 12  |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     |     |     |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 8   |     |     | 52  | 0  |     | 0   | 3   |     | 8   | 47  |
| Queuing Penalty (veh) | 0   | 7   |     |     | 35  | 0  |     | 0   | 10  |     | 56  | 46  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 620 | 188 |
| Average Queue (ft)    | 523 | 70  |
| 95th Queue (ft)       | 702 | 221 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 7   |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 41  |     |
| Queuing Penalty (veh) | 47  |     |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | NB   | SB  | SB  |
|-----------------------|-----|-----|-----|------|------|-----|-----|
| Directions Served     | LTR | LTR | L   | T    | TR   | L   | TR  |
| Maximum Queue (ft)    | 105 | 66  | 116 | 8    | 4    | 46  | 4   |
| Average Queue (ft)    | 64  | 39  | 72  | 2    | 1    | 21  | 1   |
| 95th Queue (ft)       | 112 | 73  | 133 | 15   | 7    | 53  | 7   |
| Link Distance (ft)    | 329 | 466 |     | 1235 | 1235 |     | 555 |
| Upstream Blk Time (%) |     |     |     |      |      |     |     |
| Queuing Penalty (veh) |     |     |     |      |      |     |     |
| Storage Bay Dist (ft) |     |     | 210 |      |      | 200 |     |
| Storage Blk Time (%)  |     |     |     |      |      |     |     |
| Queuing Penalty (veh) |     |     |     |      |      |     |     |



Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 37  | 15  |
| Average Queue (ft)    | 15  | 3   |
| 95th Queue (ft)       | 43  | 18  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | TR  |
| Maximum Queue (ft)    | 27  | 3   |
| Average Queue (ft)    | 14  | 1   |
| 95th Queue (ft)       | 42  | 6   |
| Link Distance (ft)    | 307 | 117 |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     |     |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LTR | L   | TR  |
| Maximum Queue (ft)    | 52  | 10  | 27  |
| Average Queue (ft)    | 32  | 3   | 5   |
| 95th Queue (ft)       | 66  | 19  | 29  |
| Link Distance (ft)    | 266 |     | 117 |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

# Queuing and Blocking Report

## SAT Future No Build

2/27/2015

### Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LR  | TR  | L   | T   | T   |
| Maximum Queue (ft)    | 60  | 4   | 50  | 9   | 30  |
| Average Queue (ft)    | 35  | 1   | 19  | 2   | 6   |
| 95th Queue (ft)       | 67  | 7   | 56  | 18  | 59  |
| Link Distance (ft)    | 511 | 896 |     | 750 | 750 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 400 |     |     |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

### Intersection: 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|
| Directions Served     | L   | LT  | R   | LT  | T   | R   | L   | T    | T    | R   | L   | T   |
| Maximum Queue (ft)    | 816 | 813 | 590 | 174 | 116 | 44  | 388 | 239  | 228  | 32  | 176 | 342 |
| Average Queue (ft)    | 729 | 719 | 413 | 134 | 49  | 20  | 294 | 190  | 162  | 6   | 116 | 159 |
| 95th Queue (ft)       | 951 | 954 | 859 | 200 | 145 | 67  | 448 | 281  | 254  | 64  | 198 | 407 |
| Link Distance (ft)    | 794 | 794 |     | 476 | 476 | 476 |     | 1210 | 1210 |     |     | 896 |
| Upstream Blk Time (%) | 39  | 42  |     |     |     |     |     |      |      |     |     |     |
| Queuing Penalty (veh) | 0   | 0   |     |     |     |     |     |      |      |     |     |     |
| Storage Bay Dist (ft) |     |     | 565 |     |     |     | 581 |      |      | 180 | 400 |     |
| Storage Blk Time (%)  |     | 57  | 0   |     |     |     |     |      | 4    | 0   |     |     |
| Queuing Penalty (veh) |     | 108 | 1   |     |     |     |     |      | 1    | 0   |     |     |

### Intersection: 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 575 | 203 |
| Average Queue (ft)    | 404 | 169 |
| 95th Queue (ft)       | 761 | 294 |
| Link Distance (ft)    | 896 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 178 |
| Storage Blk Time (%)  | 1   | 15  |
| Queuing Penalty (veh) | 8   | 48  |

### Network Summary

Network wide Queuing Penalty: 368

## **APPENDIX K**

### **Traffic Studies – Signal Warrant Analyses**

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Location: Broadview Ave at Church Street  
Date: 2040 Volumes  
County: Fauquier  
Town: Warrenton

Warrant 1 Analysis Summary

| 100% Condition A |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 150              | 600   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 100% Condition B |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 75               | 900   |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| N                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| N                | Y     |  |
| Y                | Y     |  |

| 70% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 105             | 420   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 70% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 53              | 630   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

Warrant 1 100% Condition A

Warrant 1 100% Condition B

Warrant 1 80% Combination A and B

Not Met

Not Met

Not Met

Warrant 1 70% Condition A

Warrant 1 70% Condition B

Warrant 1 56% Combination A and B

| 80% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 120             | 480   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

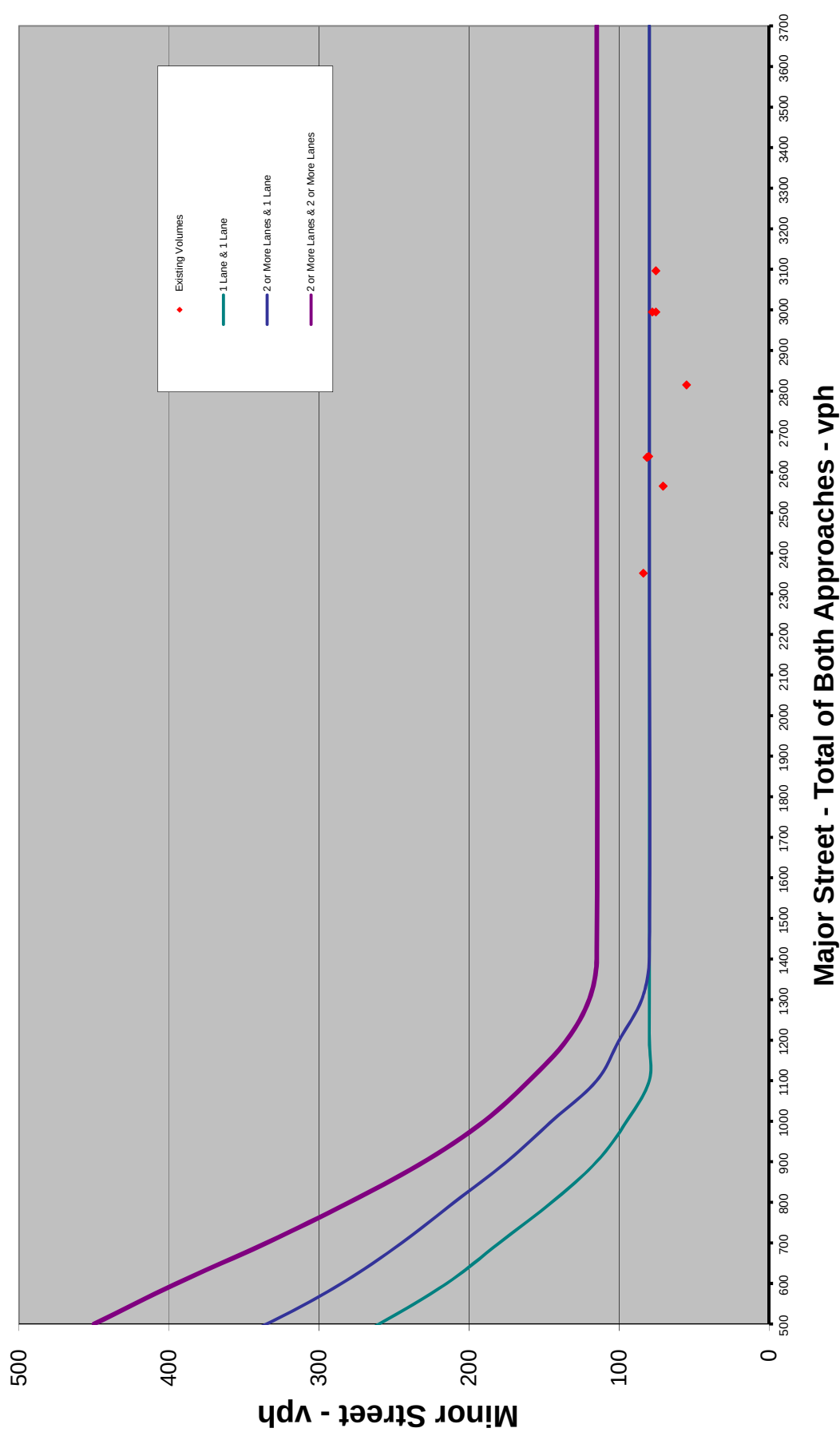
| 80% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 60              | 720   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

| 56% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 84              | 336   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

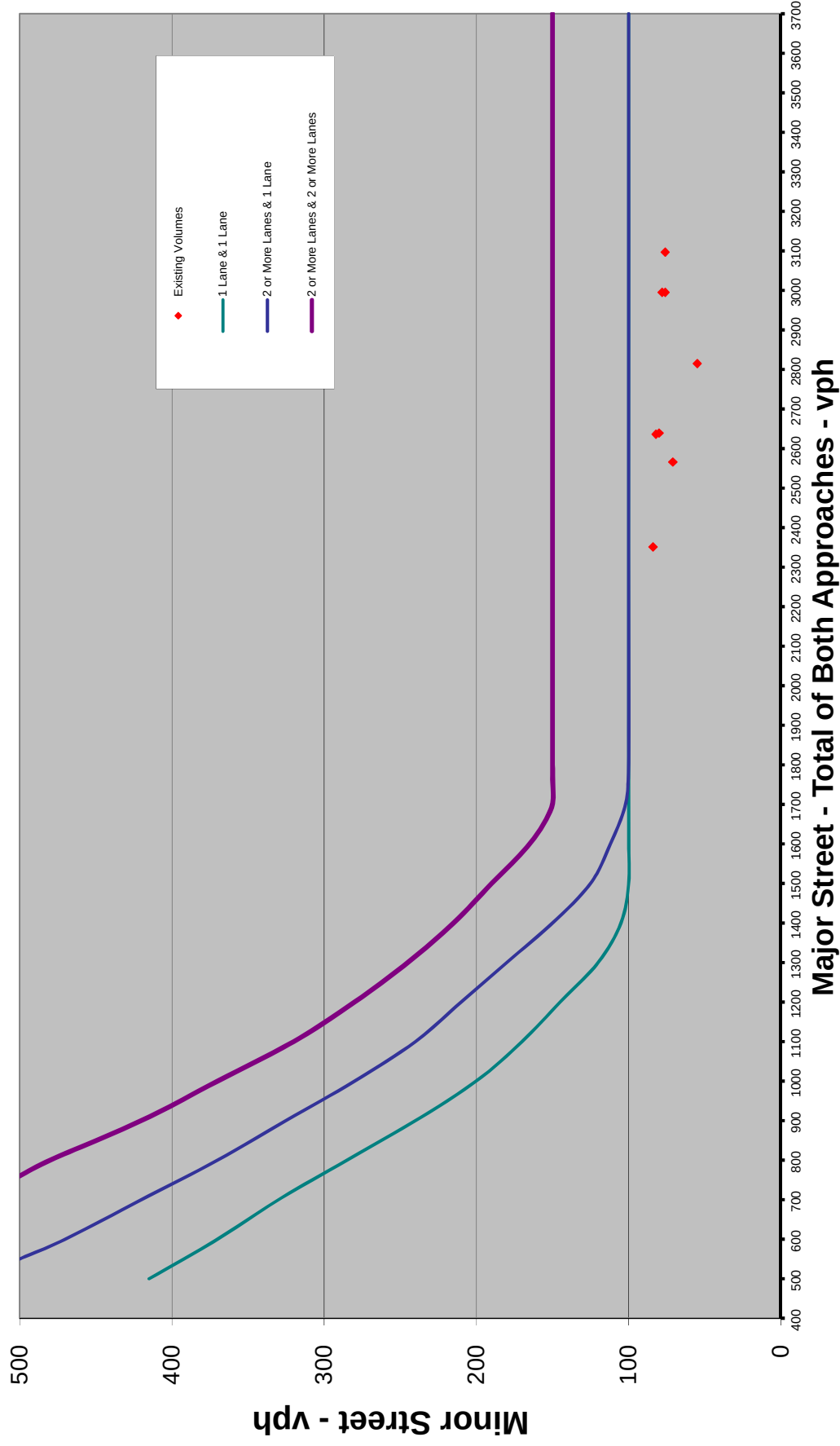
| 56% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 42              | 504   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

| VOLUMES      |              |                |      |
|--------------|--------------|----------------|------|
| Minor Street | Major Street | Total Analysis | RANK |
| 76           | 3097         | 3172           | 1    |
| 78           | 2995         | 3073           | 2    |
| 76           | 2995         | 3070           | 3    |
| 55           | 2815         | 2870           | 4    |
| 80           | 2639         | 2719           | 5    |
| 82           | 2636         | 2718           | 6    |
| 71           | 2566         | 2636           | 7    |
| 84           | 2351         | 2435           | 8    |

## Warrant 2 - Four Hour Vehicular Volume - 100%



# Warrant 3 - Peak Hour Vehicular Volume - 100%



Location: Broadview Ave at Stuyvesant St/Gold Cup Dr

Date: 12/16/2014

County: Fauquier

Town: Warrenton

Warrant 1 Analysis Summary

| 100% Condition A |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 150              | 600   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 100% Condition B |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 75               | 900   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 70% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 105             | 420   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 70% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 53              | 630   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

Warrant 1 100% Condition A

Warrant 1 100% Condition B

Warrant 1 80% Combination A and B

Not Met

Not Met

Not Met

Warrant 1 70% Condition A

Warrant 1 70% Condition B

Warrant 1 56% Combination A and B

| 80% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 120             | 480   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

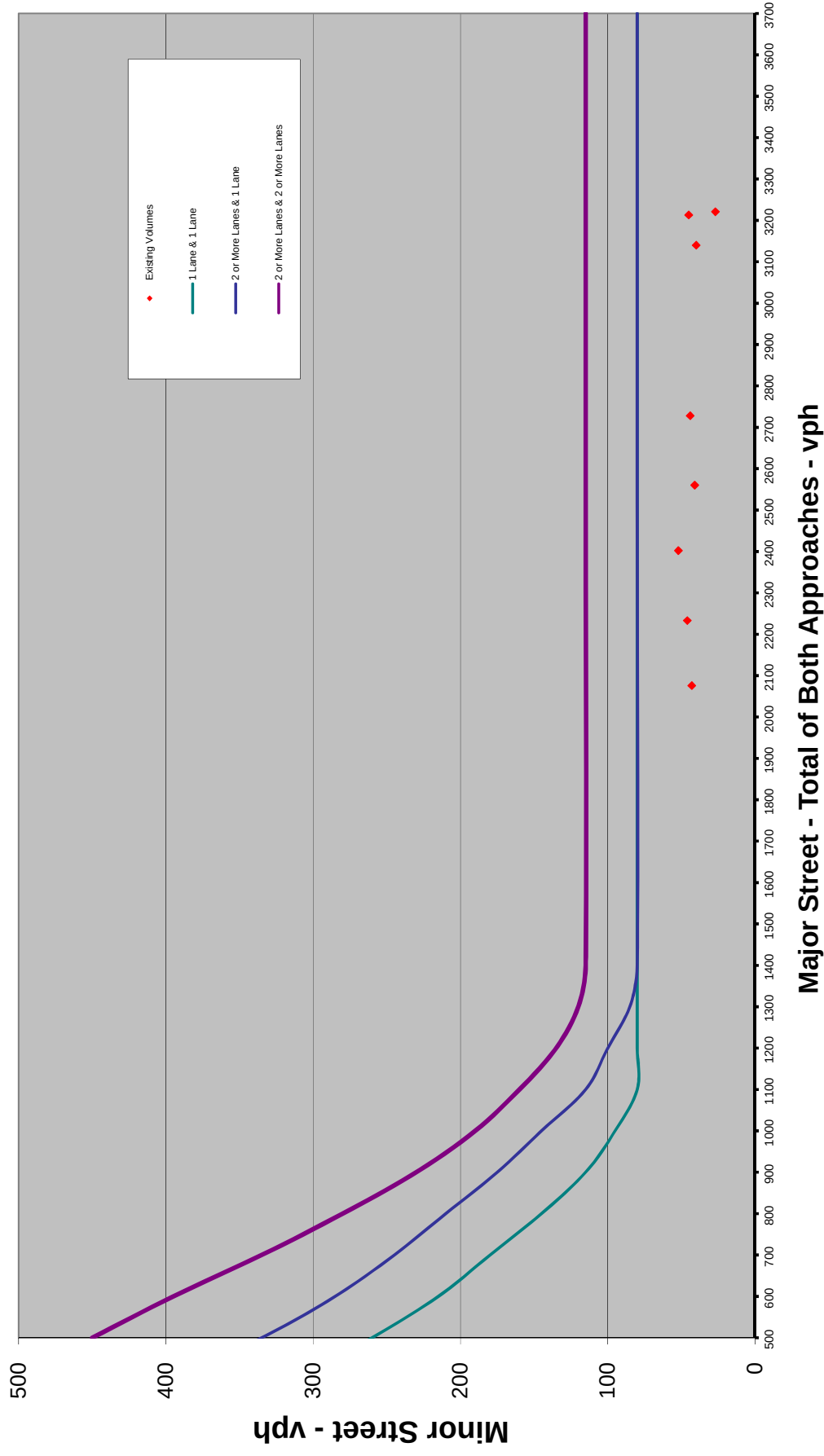
| 80% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 60              | 720   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 56% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 84              | 336   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 56% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 42              | 504   |  |
| Y               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

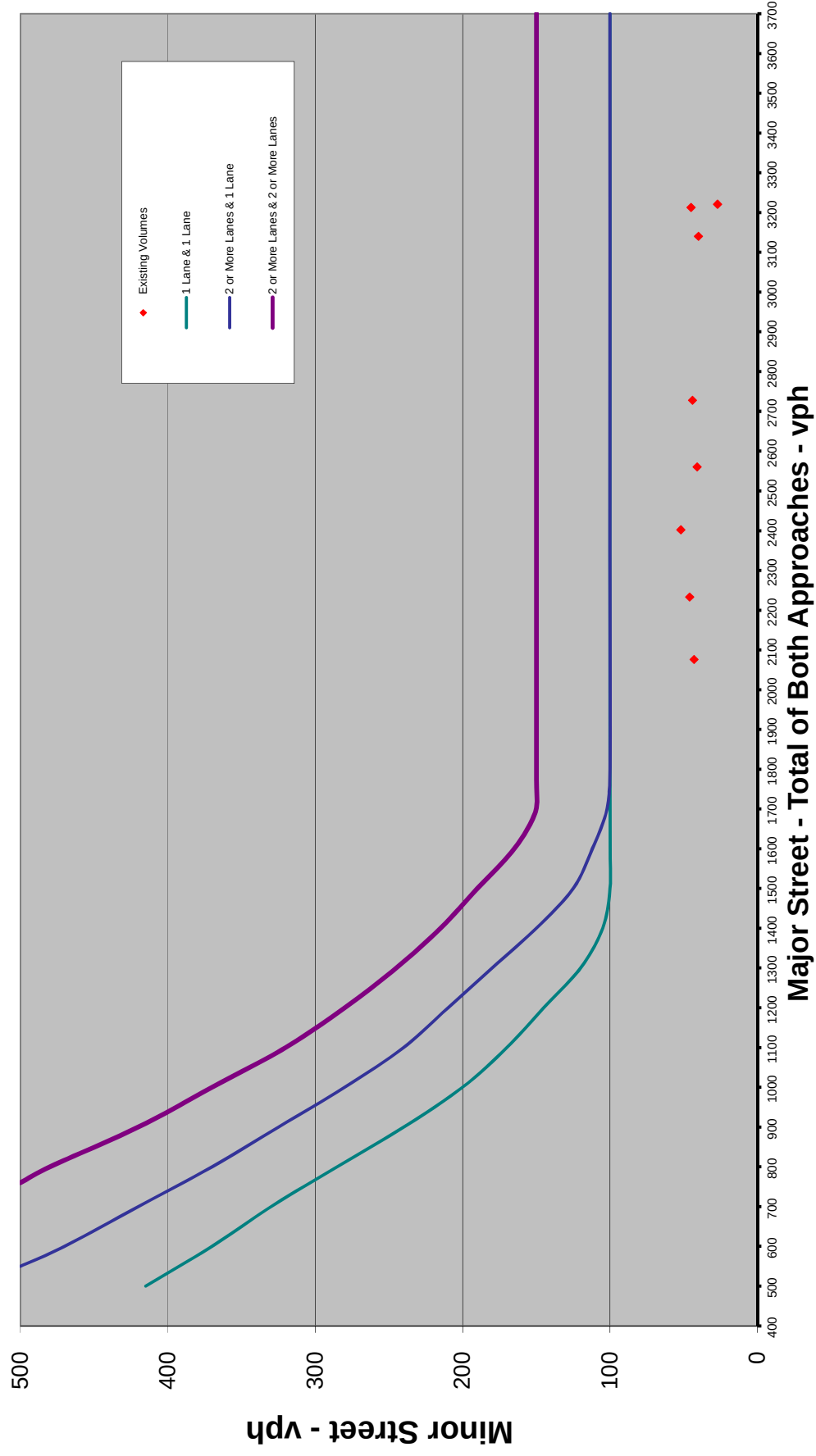
| VOLUMES      |              |                |      |   |
|--------------|--------------|----------------|------|---|
| Minor Street | Major Street | Total Analysis | RANK |   |
| 45           | 3213         | 3258           |      | 1 |
| 27           | 3221         | 3248           |      | 2 |
| 40           | 3140         | 3180           |      | 3 |
| 44           | 2728         | 2772           |      | 4 |
| 41           | 2560         | 2601           |      | 5 |
| 52           | 2402         | 2454           |      | 6 |
| 46           | 2233         | 2279           |      | 7 |
| 43           | 2076         | 2119           |      | 8 |

## Warrant 2 - Four Hour Vehicular Volume - 100%





### Warrant 3 - Peak Hour Vehicular Volume - 100%



Location: Broadview Ave at Chappell Street  
Date: 2040 Volumes  
County: Fauquier  
Town: Warrenton

## Warrant 1 Analysis Summary

| 100% Condition A |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 150              | 600   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 100% Condition B |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 75               | 900   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 80% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 120             | 480   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 80% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 60              | 720   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| VOLUMES      |              |                |      |
|--------------|--------------|----------------|------|
| Minor Street | Major Street | Total Analysis | RANK |
| 18           | 3365         | 3383           | 1    |
| 12           | 3354         | 3366           | 2    |
| 18           | 3260         | 3278           | 3    |
| 26           | 2863         | 2889           | 4    |
| 25           | 2819         | 2844           | 5    |
| 16           | 2756         | 2772           | 6    |
| 20           | 2536         | 2556           | 7    |
| 11           | 2524         | 2534           | 8    |

| 70% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 105             | 420   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 70% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 53              | 630   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

| 56% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 84              | 336   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

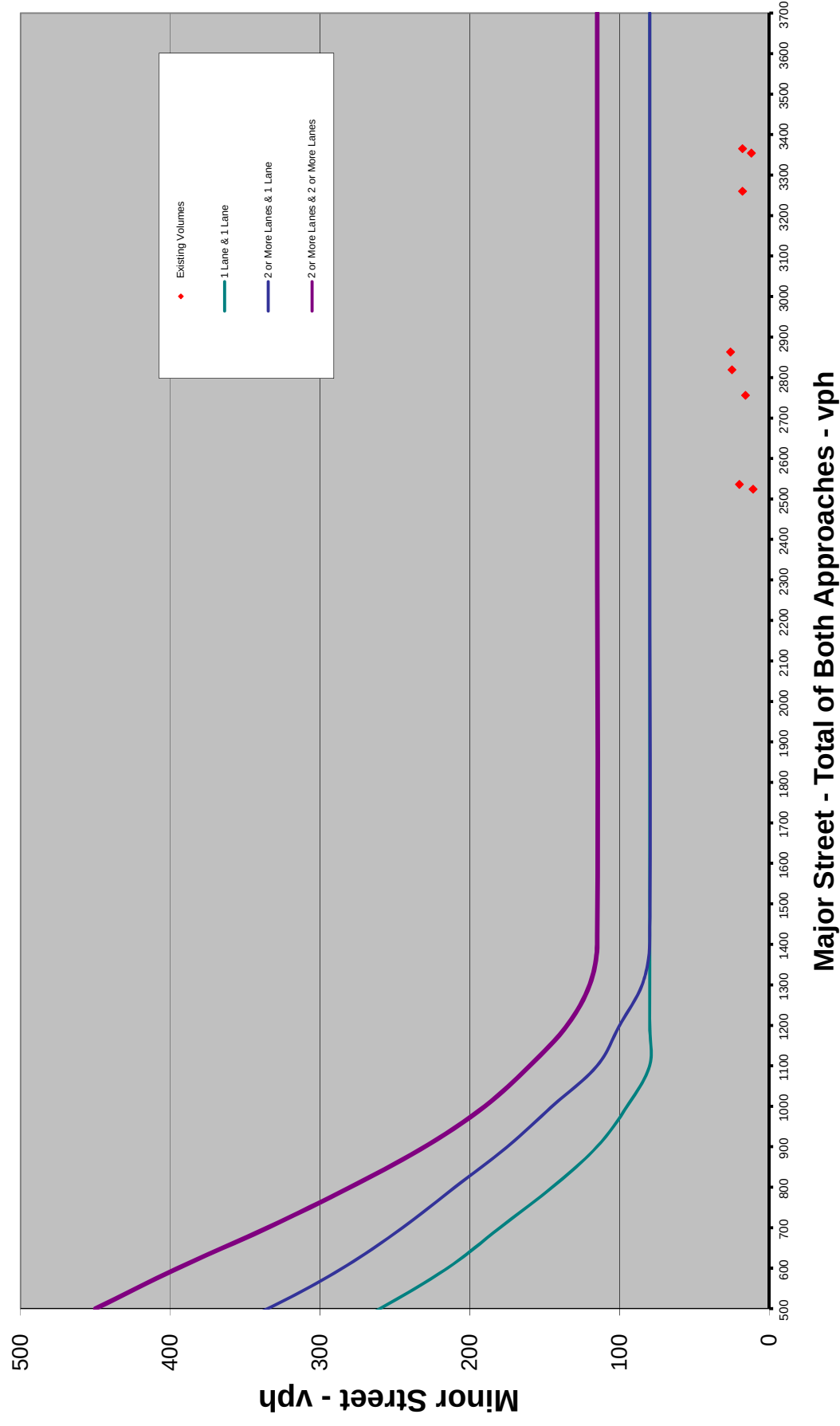
| 56% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 42              | 504   |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |

Warrant 1 100% Condition A  
Warrant 1 100% Condition B  
Warrant 1 80% Combination A and B

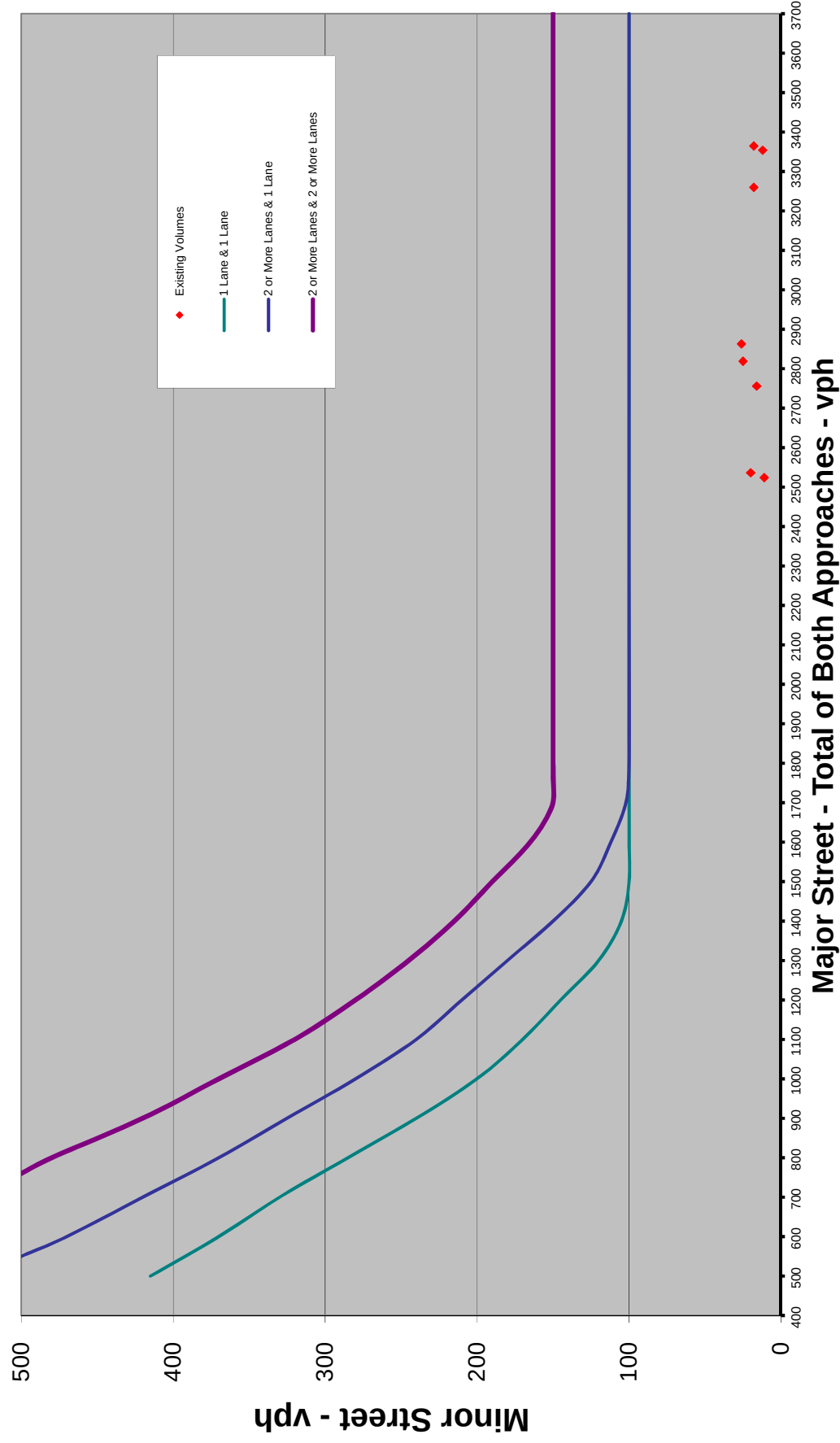
**Not Met**  
**Not Met**  
**Not Met**

Warrant 1 70% Condition B  
Warrant 1 56% Combination A and B

## Warrant 2 - Four Hour Vehicular Volume - 100%



# Warrant 3 - Peak Hour Vehicular Volume - 100%



Location: Broadview Ave at Roebling St  
Date: 12/16/2014  
County: Fauquier  
Town: Warrenton

Warrant 1 Analysis Summary

| 100% Condition A |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 150              | 600   |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |
| N                | Y     |  |

| 100% Condition B |       |  |
|------------------|-------|--|
| Minor            | Major |  |
| 75               | 900   |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |
| Y                | Y     |  |

| 70% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 105             | 420   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |

| 70% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 53              | 630   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

Warrant 1 100% Condition A  
Warrant 1 100% Condition B  
Warrant 1 80% Combination A and B  
  
Warrant 1 70% Condition A  
Warrant 1 70% Condition B  
Warrant 1 56% Combination A and B

Not Met  
MET  
  
Not Met

| 80% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 120             | 480   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |

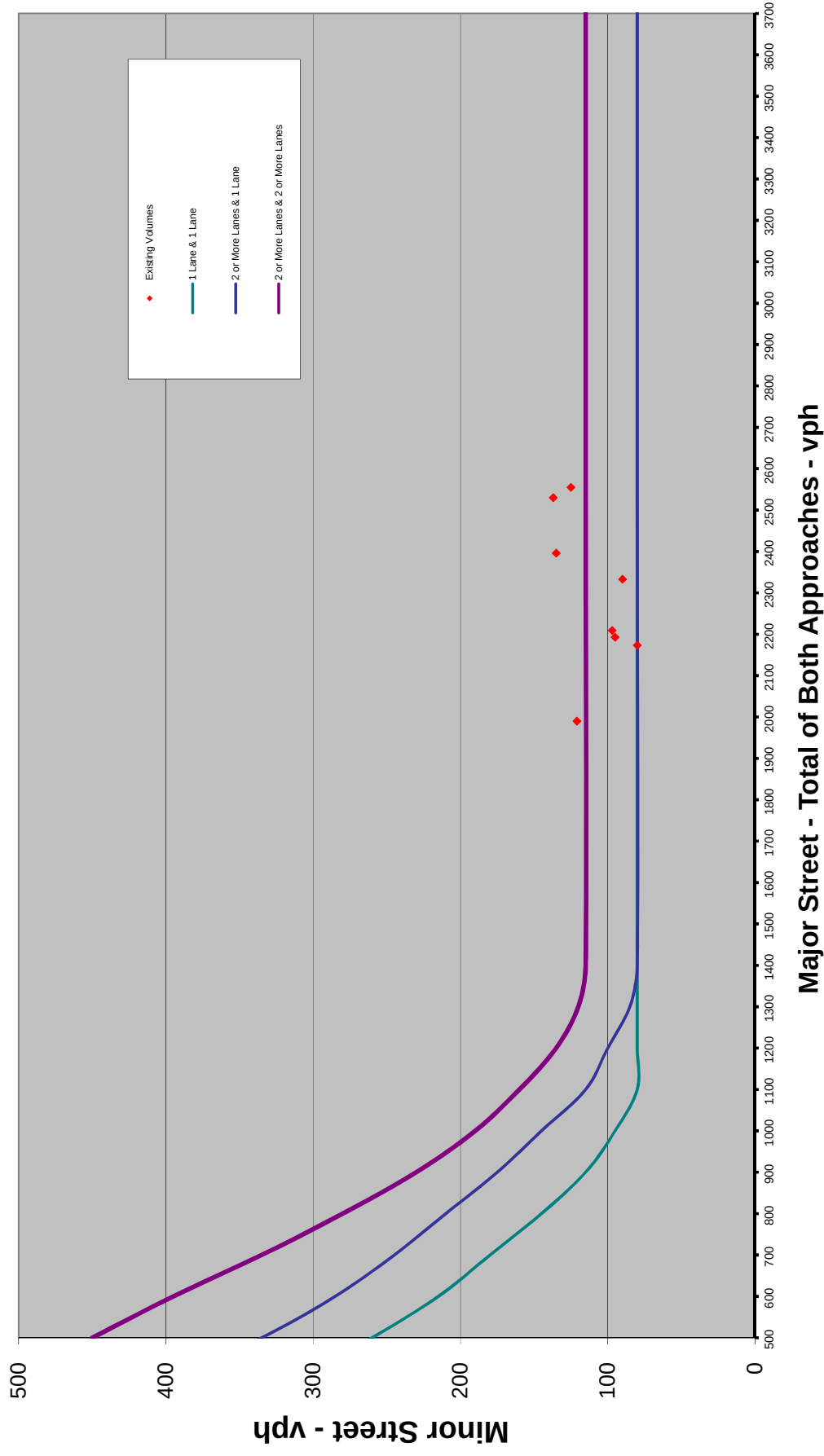
| 80% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 60              | 720   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

| 56% Condition A |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 84              | 336   |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |

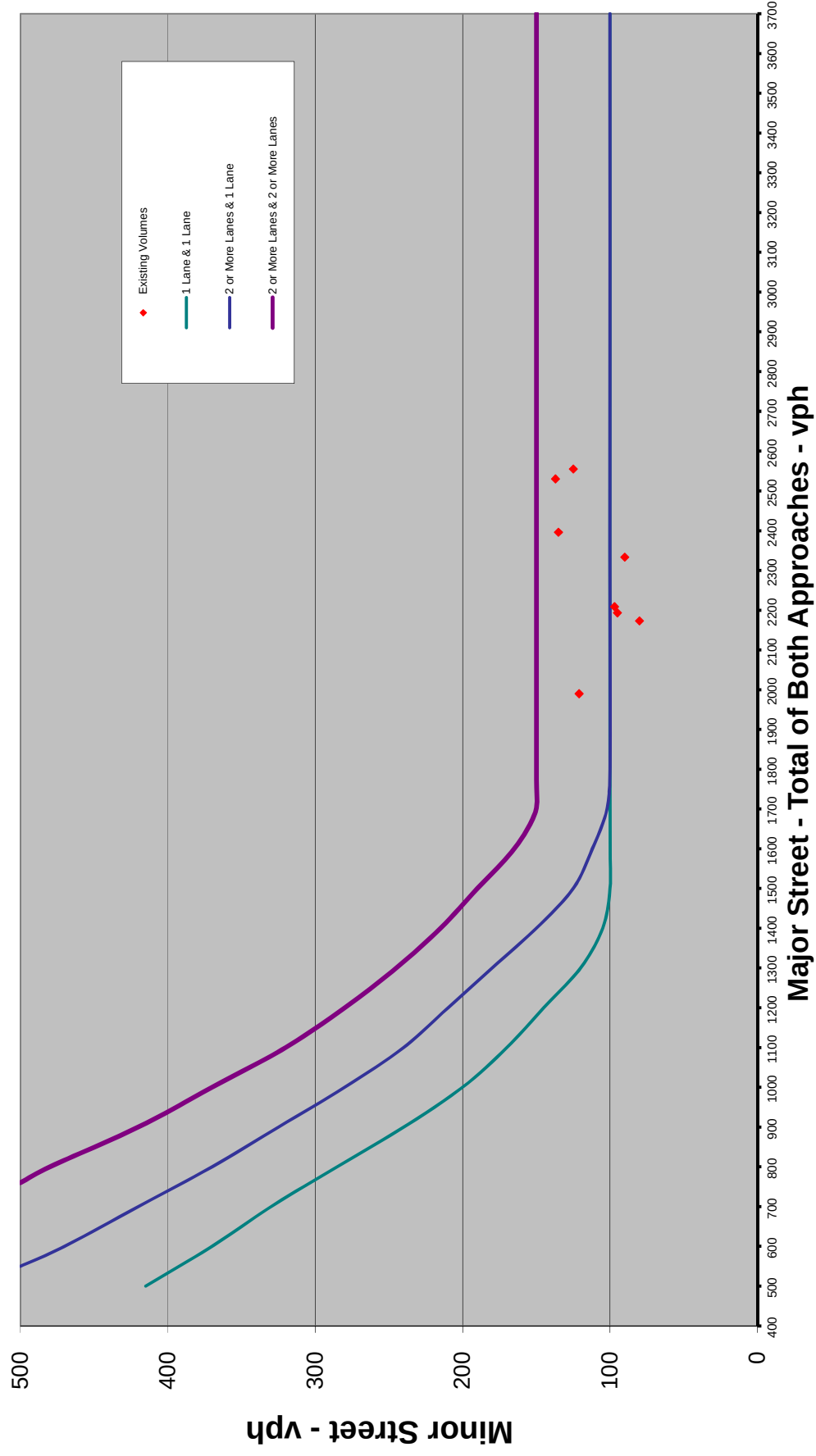
| 56% Condition B |       |  |
|-----------------|-------|--|
| Minor           | Major |  |
| 42              | 504   |  |
| Y               | Y     |  |
| N               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |
| N               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |
| Y               | Y     |  |

| VOLUMES      |              |                |      |
|--------------|--------------|----------------|------|
| Minor Street | Major Street | Total Analysis | RANK |
| 125          | 2555         | 2680           | 1    |
| 137          | 2530         | 2667           | 2    |
| 135          | 2396         | 2531           | 3    |
| 90           | 2333         | 2423           | 4    |
| 97           | 2209         | 2306           | 5    |
| 95           | 2193         | 2288           | 6    |
| 80           | 2173         | 2253           | 7    |
| 121          | 1990         | 2111           | 8    |

## Warrant 2 - Four Hour Vehicular Volume - 100%



### Warrant 3 - Peak Hour Vehicular Volume - 100%



# **APPENDIX L**

## **Traffic Studies – Proposed Improvements Operational Analyses**

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# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 149                                                                               | 73                                                                                | 295                                                                               | 85                                                                                | 104                                                                               | 35                                                                                | 294                                                                                | 854                                                                                 | 38                                                                                  | 31                                                                                  | 573                                                                                 | 245                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1739                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 162                                                                               | 79                                                                                | 321                                                                               | 92                                                                                | 113                                                                               | 38                                                                                | 320                                                                                | 928                                                                                 | 41                                                                                  | 34                                                                                  | 623                                                                                 | 266                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 94                                                                                  |
| Lane Group Flow (vph)             | 118                                                                               | 123                                                                               | 321                                                                               | 92                                                                                | 113                                                                               | 38                                                                                | 320                                                                                | 967                                                                                 | 0                                                                                   | 34                                                                                  | 623                                                                                 | 172                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 16.6                                                                              | 16.6                                                                              | 150.0                                                                             | 14.4                                                                              | 14.4                                                                              | 150.0                                                                             | 19.3                                                                               | 91.6                                                                                |                                                                                     | 7.4                                                                                 | 79.7                                                                                | 96.3                                                                                |
| Effective Green, g (s)            | 16.6                                                                              | 16.6                                                                              | 150.0                                                                             | 14.4                                                                              | 14.4                                                                              | 150.0                                                                             | 19.3                                                                               | 91.6                                                                                |                                                                                     | 7.4                                                                                 | 79.7                                                                                | 96.3                                                                                |
| Actuated g/C Ratio                | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.10                                                                              | 0.10                                                                              | 1.00                                                                              | 0.13                                                                               | 0.61                                                                                |                                                                                     | 0.05                                                                                | 0.53                                                                                | 0.64                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 186                                                                               | 192                                                                               | 1583                                                                              | 169                                                                               | 178                                                                               | 1583                                                                              | 441                                                                                | 2147                                                                                |                                                                                     | 87                                                                                  | 1880                                                                                | 1016                                                                                |
| v/s Ratio Prot                    | 0.07                                                                              | c0.07                                                                             |                                                                                   | 0.05                                                                              | c0.06                                                                             |                                                                                   | c0.09                                                                              | c0.28                                                                               |                                                                                     | 0.02                                                                                | 0.18                                                                                | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.09                                                                                |
| v/c Ratio                         | 0.63                                                                              | 0.64                                                                              | 0.20                                                                              | 0.54                                                                              | 0.63                                                                              | 0.02                                                                              | 0.73                                                                               | 0.45                                                                                |                                                                                     | 0.39                                                                                | 0.33                                                                                | 0.17                                                                                |
| Uniform Delay, d1                 | 63.8                                                                              | 63.8                                                                              | 0.0                                                                               | 64.7                                                                              | 65.3                                                                              | 0.0                                                                               | 62.8                                                                               | 15.7                                                                                |                                                                                     | 69.1                                                                                | 20.0                                                                                | 10.8                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.88                                                                               | 1.46                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 6.9                                                                               | 7.1                                                                               | 0.3                                                                               | 3.6                                                                               | 7.2                                                                               | 0.0                                                                               | 4.9                                                                                | 0.6                                                                                 |                                                                                     | 2.9                                                                                 | 0.5                                                                                 | 0.1                                                                                 |
| Delay (s)                         | 70.7                                                                              | 71.0                                                                              | 0.3                                                                               | 68.2                                                                              | 72.5                                                                              | 0.0                                                                               | 60.3                                                                               | 23.5                                                                                |                                                                                     | 72.0                                                                                | 20.5                                                                                | 10.9                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                  | C                                                                                   |                                                                                     | E                                                                                   | C                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 30.5                                                                              |                                                                                   |                                                                                   | 59.5                                                                              |                                                                                   |                                                                                    | 32.6                                                                                |                                                                                     |                                                                                     | 19.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 30.4                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |  |
| Volume (veh/h)                    | 6                                                                                 | 2                                                                                 | 104                                                                               | 7                                                                                 | 1                                                                                 | 16                                                                                | 184                                                                                 | 1109                                                                                | 11                                                                                  | 25                                                                                  | 844                                                                                 | 31                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 7                                                                                 | 2                                                                                 | 113                                                                               | 8                                                                                 | 1                                                                                 | 17                                                                                | 200                                                                                 | 1205                                                                                | 12                                                                                  | 27                                                                                  | 917                                                                                 | 34                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              |                                                                                   | 0.91                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2009                                                                              | 2606                                                                              | 476                                                                               | 2239                                                                              | 2617                                                                              | 609                                                                               | 951                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1911                                                                              | 2567                                                                              | 225                                                                               | 2163                                                                              | 2579                                                                              | 609                                                                               | 748                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 75                                                                                | 87                                                                                | 84                                                                                | 46                                                                                | 93                                                                                | 96                                                                                | 74                                                                                  |                                                                                     |                                                                                     | 95                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 27                                                                                | 17                                                                                | 708                                                                               | 14                                                                                | 16                                                                                | 438                                                                               | 779                                                                                 |                                                                                     |                                                                                     | 569                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 122                                                                               | 26                                                                                | 200                                                                               | 804                                                                               | 414                                                                               | 27                                                                                | 612                                                                                 | 339                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 7                                                                                 | 8                                                                                 | 200                                                                               | 0                                                                                 | 0                                                                                 | 27                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 113                                                                               | 17                                                                                | 0                                                                                 | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                   | 34                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 227                                                                               | 41                                                                                | 779                                                                               | 1700                                                                              | 1700                                                                              | 569                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.54                                                                              | 0.64                                                                              | 0.26                                                                              | 0.47                                                                              | 0.24                                                                              | 0.05                                                                              | 0.36                                                                                | 0.20                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 71                                                                                | 59                                                                                | 26                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 37.9                                                                              | 192.6                                                                             | 11.2                                                                              | 0.0                                                                               | 0.0                                                                               | 11.6                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | E                                                                                 | F                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 37.9                                                                              | 192.6                                                                             | 1.6                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | E                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 4.8                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 6                                                                                 | 1404                                                                              | 6                                                                                 | 9                                                                                 | 995                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 7                                                                                 | 1526                                                                              | 7                                                                                 | 10                                                                                | 1082                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2090                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2090                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 95                                                                                | 98                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 44                                                                                | 345                                                                               |                                                                                   |                                                                                   | 430                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 9                                                                                 | 1017                                                                              | 515                                                                               | 10                                                                                | 541                                                                               | 541                                                                               |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 7                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 128                                                                               | 1700                                                                              | 1700                                                                              | 430                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.07                                                                              | 0.60                                                                              | 0.30                                                                              | 0.02                                                                              | 0.32                                                                              | 0.32                                                                              |
| Queue Length 95th (ft)            | 5                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 35.2                                                                              | 0.0                                                                               | 0.0                                                                               | 13.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 35.2                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.0%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 7                                                                                 | 3                                                                                 | 1450                                                                              | 18                                                                                | 10                                                                                | 967                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 8                                                                                 | 3                                                                                 | 1576                                                                              | 20                                                                                | 11                                                                                | 1051                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2133                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2133                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 82                                                                                | 99                                                                                |                                                                                   |                                                                                   | 97                                                                                |                                                                                   |
| cM capacity (veh/h)               | 41                                                                                | 329                                                                               |                                                                                   |                                                                                   | 407                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 1051                                                                              | 545                                                                               | 11                                                                                | 526                                                                               | 526                                                                               |
| Volume Left                       | 8                                                                                 | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 3                                                                                 | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 56                                                                                | 1700                                                                              | 1700                                                                              | 407                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.19                                                                              | 0.62                                                                              | 0.32                                                                              | 0.03                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 16                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 84.4                                                                              | 0.0                                                                               | 0.0                                                                               | 14.1                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 84.4                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 50.7%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 27                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 29                                                                                  | 1423                                                                                | 0                                                                                   | 0                                                                                   | 974                                                                                 | 13                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 29                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 32                                                                                  | 1547                                                                                | 0                                                                                   | 0                                                                                   | 1059                                                                                | 14                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1902                                                                              | 2676                                                                              | 536                                                                               | 2165                                                                              | 2683                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1902                                                                              | 2676                                                                              | 536                                                                               | 2165                                                                              | 2683                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 27                                                                                | 100                                                                               | 95                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 95                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 40                                                                                | 21                                                                                | 489                                                                               | 24                                                                                | 21                                                                                | 341                                                                               | 646                                                                                 |                                                                                     |                                                                                     | 425                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 55                                                                                | 0                                                                                 | 32                                                                                | 1031                                                                              | 516                                                                               | 0                                                                                 | 706                                                                                 | 367                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 29                                                                                | 0                                                                                 | 32                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 14                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 71                                                                                | 1700                                                                              | 646                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.78                                                                              | 0.00                                                                              | 0.05                                                                              | 0.61                                                                              | 0.30                                                                              | 0.00                                                                              | 0.42                                                                                | 0.22                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 92                                                                                | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 148.5                                                                             | 0.0                                                                               | 10.9                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 148.5                                                                             | 0.0                                                                               | 0.2                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 3.2                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.3%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 43                                                                                | 1364                                                                              | 11                                                                                | 32                                                                                | 960                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 47                                                                                | 1483                                                                              | 12                                                                                | 35                                                                                | 1043                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.90                                                                              | 0.90                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |
| vC, conflicting volume            | 2080                                                                              | 747                                                                               |                                                                                   |                                                                                   | 1495                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1974                                                                              | 487                                                                               |                                                                                   |                                                                                   | 1321                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 90                                                                                | 90                                                                                |                                                                                   |                                                                                   | 93                                                                                |                                                                                   |
| cM capacity (veh/h)               | 45                                                                                | 472                                                                               |                                                                                   |                                                                                   | 465                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 51                                                                                | 988                                                                               | 506                                                                               | 35                                                                                | 522                                                                               | 522                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 47                                                                                | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 261                                                                               | 1700                                                                              | 1700                                                                              | 465                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.20                                                                              | 0.58                                                                              | 0.30                                                                              | 0.07                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 18                                                                                | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 22.1                                                                              | 0.0                                                                               | 0.0                                                                               | 13.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 22.1                                                                              | 0.0                                                                               |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.6                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 48.1%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |    |  |  |  |  |  |
| Volume (vph)                      | 855                                                                               | 212                                                                               | 216                                                                               | 36                                                                                | 119                                                                               | 103                                                                               | 207                                                                                 | 422                                                                                 | 32                                                                                  | 120                                                                                 | 405                                                                                 | 440                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt Protected                     | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1718                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1718                                                                              | 1583                                                                              |                                                                                   | 3499                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 929                                                                               | 230                                                                               | 235                                                                               | 39                                                                                | 129                                                                               | 112                                                                               | 225                                                                                 | 459                                                                                 | 35                                                                                  | 130                                                                                 | 440                                                                                 | 478                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 144                                                                               | 0                                                                                 | 0                                                                                 | 97                                                                                | 0                                                                                   | 0                                                                                   | 26                                                                                  | 0                                                                                   | 0                                                                                   | 354                                                                                 |
| Lane Group Flow (vph)             | 576                                                                               | 583                                                                               | 91                                                                                | 0                                                                                 | 168                                                                               | 15                                                                                | 225                                                                                 | 459                                                                                 | 9                                                                                   | 130                                                                                 | 440                                                                                 | 124                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 58.0                                                                              | 58.0                                                                              | 58.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              | 17.0                                                                                | 39.7                                                                                | 39.7                                                                                | 16.3                                                                                | 39.0                                                                                | 39.0                                                                                |
| Effective Green, g (s)            | 58.0                                                                              | 58.0                                                                              | 58.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              | 17.0                                                                                | 39.7                                                                                | 39.7                                                                                | 16.3                                                                                | 39.0                                                                                | 39.0                                                                                |
| Actuated g/C Ratio                | 0.39                                                                              | 0.39                                                                              | 0.39                                                                              |                                                                                   | 0.13                                                                              | 0.13                                                                              | 0.11                                                                                | 0.26                                                                                | 0.26                                                                                | 0.11                                                                                | 0.26                                                                                | 0.26                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 649                                                                               | 664                                                                               | 612                                                                               |                                                                                   | 466                                                                               | 211                                                                               | 200                                                                                 | 936                                                                                 | 418                                                                                 | 192                                                                                 | 920                                                                                 | 411                                                                                 |
| v/s Ratio Prot                    | c0.34                                                                             | 0.34                                                                              |                                                                                   |                                                                                   | c0.05                                                                             |                                                                                   | c0.13                                                                               | c0.13                                                                               |                                                                                     | 0.07                                                                                | 0.12                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.89                                                                              | 0.88                                                                              | 0.15                                                                              |                                                                                   | 0.36                                                                              | 0.07                                                                              | 1.12                                                                                | 0.49                                                                                | 0.02                                                                                | 0.68                                                                                | 0.48                                                                                | 0.30                                                                                |
| Uniform Delay, d1                 | 43.0                                                                              | 42.7                                                                              | 29.9                                                                              |                                                                                   | 59.2                                                                              | 56.9                                                                              | 66.5                                                                                | 46.6                                                                                | 40.8                                                                                | 64.3                                                                                | 46.9                                                                                | 44.6                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 0.99                                                                                | 1.23                                                                                | 4.81                                                                                |
| Incremental Delay, d2             | 13.9                                                                              | 12.6                                                                              | 0.1                                                                               |                                                                                   | 0.5                                                                               | 0.1                                                                               | 101.2                                                                               | 1.8                                                                                 | 0.1                                                                                 | 9.0                                                                                 | 1.8                                                                                 | 1.9                                                                                 |
| Delay (s)                         | 56.8                                                                              | 55.3                                                                              | 30.0                                                                              |                                                                                   | 59.7                                                                              | 57.0                                                                              | 167.8                                                                               | 48.4                                                                                | 40.9                                                                                | 72.3                                                                                | 59.3                                                                                | 216.4                                                                               |
| Level of Service                  | E                                                                                 | E                                                                                 | C                                                                                 |                                                                                   | E                                                                                 | E                                                                                 | F                                                                                   | D                                                                                   | D                                                                                   | E                                                                                   | E                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 51.7                                                                              |                                                                                   |                                                                                   | 58.6                                                                              |                                                                                   |                                                                                     | 85.4                                                                                |                                                                                     |                                                                                     | 132.5                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 83.9                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | F                                                                                   |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 16.0                                                                                |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 74.1%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | D                                                                                   |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
AM 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 214 | 294 | 122 | 150 | 240 | 79 | 208 | 272 | 367 | 376 | 164 | 287 |
| Average Queue (ft)    | 78  | 153 | 32  | 75  | 113 | 25 | 117 | 142 | 195 | 214 | 49  | 173 |
| 95th Queue (ft)       | 202 | 246 | 94  | 135 | 202 | 82 | 189 | 236 | 327 | 346 | 123 | 262 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 4   |     |     | 45  | 0  | 0   | 0   | 1   |     | 1   | 19  |
| Queuing Penalty (veh) | 0   | 3   |     |     | 16  | 0  | 0   | 0   | 3   |     | 2   | 6   |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 276 | 218 |
| Average Queue (ft)    | 138 | 58  |
| 95th Queue (ft)       | 241 | 141 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 2   | 0   |
| Queuing Penalty (veh) | 4   | 0   |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | SB  | SB  |
|-----------------------|-----|-----|-----|------|-----|-----|
| Directions Served     | LTR | LTR | L   | T    | L   | TR  |
| Maximum Queue (ft)    | 150 | 77  | 131 | 7    | 54  | 29  |
| Average Queue (ft)    | 52  | 24  | 56  | 0    | 14  | 2   |
| 95th Queue (ft)       | 106 | 59  | 103 | 6    | 41  | 13  |
| Link Distance (ft)    | 329 | 466 |     | 1235 |     | 555 |
| Upstream Blk Time (%) |     |     |     |      |     |     |
| Queuing Penalty (veh) |     |     |     |      |     |     |
| Storage Bay Dist (ft) |     |     | 210 |      | 200 |     |
| Storage Blk Time (%)  |     |     |     |      |     |     |
| Queuing Penalty (veh) |     |     |     |      |     |     |



Queuing and Blocking Report  
AM 2040 No Build Restricted Left Turns

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Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 35  | 31  |
| Average Queue (ft)    | 6   | 5   |
| 95th Queue (ft)       | 27  | 25  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LR  | T   | L   |
| Maximum Queue (ft)    | 38  | 27  | 38  |
| Average Queue (ft)    | 9   | 1   | 9   |
| 95th Queue (ft)       | 32  | 13  | 32  |
| Link Distance (ft)    | 307 | 117 |     |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LTR | L   | TR  |
| Maximum Queue (ft)    | 126 | 59  | 12  |
| Average Queue (ft)    | 38  | 15  | 0   |
| 95th Queue (ft)       | 90  | 45  | 7   |
| Link Distance (ft)    | 266 |     | 117 |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

Queuing and Blocking Report  
AM 2040 No Build Restricted Left Turns

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Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 84  | 70  |
| Average Queue (ft)    | 31  | 21  |
| 95th Queue (ft)       | 62  | 56  |
| Link Distance (ft)    | 511 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 400 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|
| Directions Served     | L   | LT  | R   | LT  | T   | R   | L   | T    | T    | R   | L   | T   |
| Maximum Queue (ft)    | 629 | 592 | 196 | 184 | 166 | 121 | 470 | 332  | 245  | 152 | 205 | 317 |
| Average Queue (ft)    | 407 | 380 | 11  | 112 | 36  | 22  | 271 | 175  | 146  | 6   | 117 | 166 |
| 95th Queue (ft)       | 572 | 547 | 141 | 178 | 123 | 81  | 456 | 308  | 227  | 58  | 192 | 256 |
| Link Distance (ft)    | 794 | 794 |     | 476 | 476 | 476 |     | 1210 | 1210 |     |     | 896 |
| Upstream Blk Time (%) |     |     |     |     |     |     |     |      |      |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |     |      |      |     |     |     |
| Storage Bay Dist (ft) |     |     | 565 |     |     |     | 581 |      |      | 180 | 400 |     |
| Storage Blk Time (%)  |     | 0   | 0   |     |     |     | 0   | 0    | 5    | 0   |     |     |
| Queuing Penalty (veh) |     | 1   | 0   |     |     |     | 1   | 0    | 2    | 0   |     |     |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 369 | 203 |
| Average Queue (ft)    | 185 | 70  |
| 95th Queue (ft)       | 308 | 227 |
| Link Distance (ft)    | 896 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 178 |
| Storage Blk Time (%)  | 10  | 1   |
| Queuing Penalty (veh) | 43  | 1   |

Network Summary

Network wide Queuing Penalty: 82

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 302                                                                               | 85                                                                                | 342                                                                               | 125                                                                               | 164                                                                               | 40                                                                                | 358                                                                                 | 1386                                                                                | 34                                                                                  | 71                                                                                  | 1340                                                                                | 133                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                                | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1721                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 328                                                                               | 92                                                                                | 372                                                                               | 136                                                                               | 178                                                                               | 43                                                                                | 389                                                                                 | 1507                                                                                | 37                                                                                  | 77                                                                                  | 1457                                                                                | 145                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 33                                                                                  |
| Lane Group Flow (vph)             | 207                                                                               | 213                                                                               | 372                                                                               | 136                                                                               | 178                                                                               | 43                                                                                | 389                                                                                 | 1543                                                                                | 0                                                                                   | 77                                                                                  | 1457                                                                                | 112                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                                | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 23.6                                                                              | 23.6                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                                | 83.8                                                                                |                                                                                     | 12.4                                                                                | 72.8                                                                                | 96.4                                                                                |
| Effective Green, g (s)            | 23.6                                                                              | 23.6                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                                | 83.8                                                                                |                                                                                     | 12.4                                                                                | 72.8                                                                                | 96.4                                                                                |
| Actuated g/C Ratio                | 0.15                                                                              | 0.15                                                                              | 1.00                                                                              | 0.13                                                                              | 0.13                                                                              | 1.00                                                                              | 0.15                                                                                | 0.52                                                                                |                                                                                     | 0.08                                                                                | 0.45                                                                                | 0.60                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 247                                                                               | 253                                                                               | 1583                                                                              | 223                                                                               | 235                                                                               | 1583                                                                              | 502                                                                                 | 1846                                                                                |                                                                                     | 137                                                                                 | 1610                                                                                | 953                                                                                 |
| v/s Ratio Prot                    | 0.12                                                                              | c0.12                                                                             |                                                                                   | 0.08                                                                              | c0.10                                                                             |                                                                                   | c0.11                                                                               | c0.44                                                                               |                                                                                     | 0.04                                                                                | c0.41                                                                               | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   | 0.03                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.05                                                                                |
| v/c Ratio                         | 0.84                                                                              | 0.84                                                                              | 0.23                                                                              | 0.61                                                                              | 0.76                                                                              | 0.03                                                                              | 0.77                                                                                | 0.84                                                                                |                                                                                     | 0.56                                                                                | 0.90                                                                                | 0.12                                                                                |
| Uniform Delay, d1                 | 66.3                                                                              | 66.4                                                                              | 0.0                                                                               | 66.2                                                                              | 67.5                                                                              | 0.0                                                                               | 65.8                                                                                | 32.3                                                                                |                                                                                     | 71.2                                                                                | 40.4                                                                                | 13.6                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 21.3                                                                              | 21.6                                                                              | 0.3                                                                               | 4.7                                                                               | 13.0                                                                              | 0.0                                                                               | 7.3                                                                                 | 4.7                                                                                 |                                                                                     | 5.2                                                                                 | 8.8                                                                                 | 0.1                                                                                 |
| Delay (s)                         | 87.6                                                                              | 88.0                                                                              | 0.3                                                                               | 70.8                                                                              | 80.6                                                                              | 0.0                                                                               | 73.1                                                                                | 36.9                                                                                |                                                                                     | 76.4                                                                                | 49.2                                                                                | 13.7                                                                                |
| Level of Service                  | F                                                                                 | F                                                                                 | A                                                                                 | E                                                                                 | F                                                                                 | A                                                                                 | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                   | 67.2                                                                              |                                                                                   |                                                                                     | 44.2                                                                                |                                                                                     |                                                                                     | 47.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 47.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 83.2%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 10                                                                                | 0                                                                                 | 157                                                                               | 2                                                                                 | 0                                                                                 | 13                                                                                | 154                                                                                 | 1686                                                                                | 23                                                                                  | 32                                                                                  | 1712                                                                                | 40                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 11                                                                                | 0                                                                                 | 171                                                                               | 2                                                                                 | 0                                                                                 | 14                                                                                | 167                                                                                 | 1833                                                                                | 25                                                                                  | 35                                                                                  | 1861                                                                                | 43                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              | 0.61                                                                              |                                                                                   | 0.61                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3217                                                                              | 4145                                                                              | 952                                                                               | 3351                                                                              | 4154                                                                              | 929                                                                               | 1904                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3357                                                                              | 4878                                                                              | 0                                                                                 | 3575                                                                              | 4893                                                                              | 929                                                                               | 1202                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 74                                                                                | 0                                                                                 | 100                                                                               | 95                                                                                | 52                                                                                  |                                                                                     |                                                                                     | 89                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 661                                                                               | 1                                                                                 | 0                                                                                 | 269                                                                               | 351                                                                                 |                                                                                     |                                                                                     | 322                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 182                                                                               | 16                                                                                | 167                                                                               | 1222                                                                              | 636                                                                               | 35                                                                                | 1241                                                                                | 664                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 11                                                                                | 2                                                                                 | 167                                                                               | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 171                                                                               | 14                                                                                | 0                                                                                 | 0                                                                                 | 25                                                                                | 0                                                                                 | 0                                                                                   | 43                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 17                                                                                | 4                                                                                 | 351                                                                               | 1700                                                                              | 1700                                                                              | 322                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 10.80                                                                             | 4.08                                                                              | 0.48                                                                              | 0.72                                                                              | 0.37                                                                              | 0.11                                                                              | 0.73                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | Err                                                                               | 62                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | Err                                                                               | 24.2                                                                              | 0.0                                                                               | 0.0                                                                               | 17.5                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | Err                                                                               | 2.0                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 476.4                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 78.8%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 8                                                                                 | 1674                                                                              | 5                                                                                 | 28                                                                                | 1849                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 9                                                                                 | 1820                                                                              | 5                                                                                 | 30                                                                                | 2010                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2888                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2888                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 81                                                                                | 97                                                                                |                                                                                   |                                                                                   | 91                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 276                                                                               |                                                                                   |                                                                                   | 331                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 1213                                                                              | 612                                                                               | 30                                                                                | 1005                                                                              | 1005                                                                              |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 30                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 9                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 49                                                                                | 1700                                                                              | 1700                                                                              | 331                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.22                                                                              | 0.71                                                                              | 0.36                                                                              | 0.09                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 18                                                                                | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 97.3                                                                              | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 97.3                                                                              | 0.0                                                                               |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.1%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 23                                                                                | 14                                                                                | 1649                                                                              | 18                                                                                | 19                                                                                | 1885                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 25                                                                                | 15                                                                                | 1792                                                                              | 20                                                                                | 21                                                                                | 2049                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2868                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2868                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 0                                                                                 | 95                                                                                |                                                                                   |                                                                                   | 94                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 279                                                                               |                                                                                   |                                                                                   | 335                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 40                                                                                | 1195                                                                              | 617                                                                               | 21                                                                                | 1024                                                                              | 1024                                                                              |
| Volume Left                       | 25                                                                                | 0                                                                                 | 0                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 15                                                                                | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 19                                                                                | 1700                                                                              | 1700                                                                              | 335                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 2.08                                                                              | 0.70                                                                              | 0.36                                                                              | 0.06                                                                              | 0.60                                                                              | 0.60                                                                              |
| Queue Length 95th (ft)            | 135                                                                               | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 919.6                                                                             | 0.0                                                                               | 0.0                                                                               | 16.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 919.6                                                                             | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 9.5                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.1%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 10                                                                                | 0                                                                                 | 24                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 55                                                                                  | 1639                                                                                | 0                                                                                   | 0                                                                                   | 1907                                                                                | 57                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 11                                                                                | 0                                                                                 | 26                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 60                                                                                  | 1782                                                                                | 0                                                                                   | 0                                                                                   | 2073                                                                                | 62                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3115                                                                              | 4005                                                                              | 1067                                                                              | 2964                                                                              | 4036                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3115                                                                              | 4005                                                                              | 1067                                                                              | 2964                                                                              | 4036                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 100                                                                               | 88                                                                                | 100                                                                               | 47                                                                                | 100                                                                               | 76                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 2                                                                                 | 2                                                                                 | 218                                                                               | 5                                                                                 | 2                                                                                 | 286                                                                               | 250                                                                                 |                                                                                     |                                                                                     | 344                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 37                                                                                | 1                                                                                 | 60                                                                                | 1188                                                                              | 594                                                                               | 0                                                                                 | 1382                                                                                | 753                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 11                                                                                | 0                                                                                 | 60                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 62                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 8                                                                                 | 2                                                                                 | 250                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 4.82                                                                              | 0.53                                                                              | 0.24                                                                              | 0.70                                                                              | 0.35                                                                              | 0.00                                                                              | 0.81                                                                                | 0.44                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | 15                                                                                | 23                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | 2332.2                                                                            | 23.8                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | 2332.2                                                                            | 0.8                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 93.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 69.9%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| ICU Level of Service              | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 66                                                                                | 1553                                                                              | 10                                                                                | 39                                                                                | 1972                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 72                                                                                | 1688                                                                              | 11                                                                                | 42                                                                                | 2143                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.85                                                                              | 0.85                                                                              |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |
| vC, conflicting volume            | 2850                                                                              | 849                                                                               |                                                                                   |                                                                                   | 1699                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2823                                                                              | 462                                                                               |                                                                                   |                                                                                   | 1465                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 59                                                                                | 85                                                                                |                                                                                   |                                                                                   | 89                                                                                |                                                                                   |
| cM capacity (veh/h)               | 11                                                                                | 463                                                                               |                                                                                   |                                                                                   | 387                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 76                                                                                | 1125                                                                              | 574                                                                               | 42                                                                                | 1072                                                                              | 1072                                                                              |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 42                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 72                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 135                                                                               | 1700                                                                              | 1700                                                                              | 387                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.56                                                                              | 0.66                                                                              | 0.34                                                                              | 0.11                                                                              | 0.63                                                                              | 0.63                                                                              |
| Queue Length 95th (ft)            | 70                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 61.5                                                                              | 0.0                                                                               | 0.0                                                                               | 15.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 61.5                                                                              | 0.0                                                                               |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 1.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 65.5%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | C                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |



# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |    |  |  |  |  |  |
| Volume (vph)                      | 657                                                                               | 140                                                                               | 91                                                                                | 82                                                                                | 372                                                                               | 145                                                                               | 404                                                                                 | 701                                                                                 | 32                                                                                  | 110                                                                                 | 721                                                                                 | 1139                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1714                                                                              | 1583                                                                              |                                                                                   | 3508                                                                              | 1583                                                                              | 1770                                                                                | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 714                                                                               | 152                                                                               | 99                                                                                | 89                                                                                | 404                                                                               | 158                                                                               | 439                                                                                 | 762                                                                                 | 35                                                                                  | 120                                                                                 | 784                                                                                 | 1238                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 77                                                                                | 0                                                                                 | 0                                                                                 | 136                                                                               | 0                                                                                   | 0                                                                                   | 20                                                                                  | 0                                                                                   | 0                                                                                   | 300                                                                                 |
| Lane Group Flow (vph)             | 428                                                                               | 438                                                                               | 22                                                                                | 0                                                                                 | 493                                                                               | 22                                                                                | 439                                                                                 | 762                                                                                 | 15                                                                                  | 120                                                                                 | 784                                                                                 | 938                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                                | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 36.0                                                                              | 36.0                                                                              | 36.0                                                                              |                                                                                   | 22.0                                                                              | 22.0                                                                              | 20.0                                                                                | 69.9                                                                                | 69.9                                                                                | 16.1                                                                                | 66.0                                                                                | 66.0                                                                                |
| Effective Green, g (s)            | 36.0                                                                              | 36.0                                                                              | 36.0                                                                              |                                                                                   | 22.0                                                                              | 22.0                                                                              | 20.0                                                                                | 69.9                                                                                | 69.9                                                                                | 16.1                                                                                | 66.0                                                                                | 66.0                                                                                |
| Actuated g/C Ratio                | 0.22                                                                              | 0.22                                                                              | 0.22                                                                              |                                                                                   | 0.14                                                                              | 0.14                                                                              | 0.12                                                                                | 0.44                                                                                | 0.44                                                                                | 0.10                                                                                | 0.41                                                                                | 0.41                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 378                                                                               | 385                                                                               | 356                                                                               |                                                                                   | 482                                                                               | 217                                                                               | 221                                                                                 | 1546                                                                                | 691                                                                                 | 178                                                                                 | 1459                                                                                | 652                                                                                 |
| v/s Ratio Prot                    | 0.25                                                                              | c0.26                                                                             |                                                                                   |                                                                                   | c0.14                                                                             |                                                                                   | c0.25                                                                               | c0.22                                                                               |                                                                                     | 0.07                                                                                | 0.22                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                     |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | c0.59                                                                               |
| v/c Ratio                         | 1.13                                                                              | 1.14                                                                              | 0.06                                                                              |                                                                                   | 1.02                                                                              | 0.10                                                                              | 1.99                                                                                | 0.49                                                                                | 0.02                                                                                | 0.67                                                                                | 0.54                                                                                | 1.44                                                                                |
| Uniform Delay, d1                 | 62.0                                                                              | 62.0                                                                              | 48.7                                                                              |                                                                                   | 69.0                                                                              | 60.3                                                                              | 70.0                                                                                | 32.3                                                                                | 25.6                                                                                | 69.4                                                                                | 35.5                                                                                | 47.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 87.3                                                                              | 88.9                                                                              | 0.1                                                                               |                                                                                   | 46.9                                                                              | 0.2                                                                               | 459.7                                                                               | 0.2                                                                                 | 0.0                                                                                 | 9.7                                                                                 | 0.4                                                                                 | 205.9                                                                               |
| Delay (s)                         | 149.3                                                                             | 150.9                                                                             | 48.8                                                                              |                                                                                   | 115.9                                                                             | 60.5                                                                              | 529.7                                                                               | 32.6                                                                                | 25.6                                                                                | 79.1                                                                                | 35.9                                                                                | 252.9                                                                               |
| Level of Service                  | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | F                                                                                 | E                                                                                 | F                                                                                   | C                                                                                   | C                                                                                   | E                                                                                   | D                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 139.7                                                                             |                                                                                   |                                                                                   | 102.5                                                                             |                                                                                   |                                                                                     | 209.0                                                                               |                                                                                     |                                                                                     | 163.7                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 162.3                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.35                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 119.6%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | H                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
PM 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 225 | 426 | 304 | 226 | 328 | 80 | 260 | 324 | 559 | 559 | 165 | 649 |
| Average Queue (ft)    | 177 | 248 | 140 | 106 | 171 | 28 | 149 | 233 | 354 | 364 | 89  | 542 |
| 95th Queue (ft)       | 251 | 371 | 257 | 189 | 293 | 86 | 226 | 375 | 549 | 545 | 172 | 729 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     | 0   | 0   |     | 11  |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     | 3   | 4   |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 1   | 23  |     |     | 60  | 0  | 0   | 0   | 13  |     | 4   | 48  |
| Queuing Penalty (veh) | 3   | 35  |     |     | 24  | 1  | 1   | 1   | 45  |     | 27  | 34  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 666 | 220 |
| Average Queue (ft)    | 523 | 104 |
| 95th Queue (ft)       | 721 | 267 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 10  |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 40  | 0   |
| Queuing Penalty (veh) | 53  | 0   |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | NB   | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|------|------|-----|-----|-----|
| Directions Served     | LTR | LTR | L   | T    | TR   | L   | T   | TR  |
| Maximum Queue (ft)    | 344 | 74  | 210 | 136  | 94   | 109 | 355 | 572 |
| Average Queue (ft)    | 261 | 21  | 98  | 9    | 5    | 24  | 31  | 48  |
| 95th Queue (ft)       | 433 | 74  | 180 | 81   | 48   | 70  | 202 | 280 |
| Link Distance (ft)    | 329 | 466 |     | 1235 | 1235 |     | 555 | 555 |
| Upstream Blk Time (%) | 54  |     |     |      |      |     | 0   | 1   |
| Queuing Penalty (veh) | 0   |     |     |      |      |     | 1   | 12  |
| Storage Bay Dist (ft) |     |     | 210 |      |      | 200 |     |     |
| Storage Blk Time (%)  |     |     | 1   | 0    |      |     | 2   |     |
| Queuing Penalty (veh) |     |     | 7   | 0    |      |     | 1   |     |

Queuing and Blocking Report  
PM 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | NB  | SB  | SB   | SB   |
|-----------------------|-----|-----|-----|------|------|
| Directions Served     | LR  | T   | L   | T    | T    |
| Maximum Queue (ft)    | 45  | 7   | 524 | 1172 | 1171 |
| Average Queue (ft)    | 12  | 0   | 71  | 366  | 380  |
| 95th Queue (ft)       | 40  | 5   | 331 | 1119 | 1143 |
| Link Distance (ft)    | 483 | 756 |     | 1235 | 1235 |
| Upstream Blk Time (%) |     |     |     | 1    | 2    |
| Queuing Penalty (veh) |     |     |     | 9    | 14   |
| Storage Bay Dist (ft) |     |     | 500 |      |      |
| Storage Blk Time (%)  |     |     |     | 20   |      |
| Queuing Penalty (veh) |     |     |     | 6    |      |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | NB  | NB  | SB  | SB   | SB   |
|-----------------------|-----|-----|-----|-----|------|------|
| Directions Served     | LR  | T   | TR  | L   | T    | T    |
| Maximum Queue (ft)    | 284 | 17  | 18  | 366 | 804  | 794  |
| Average Queue (ft)    | 160 | 1   | 1   | 23  | 469  | 477  |
| 95th Queue (ft)       | 353 | 10  | 12  | 143 | 1037 | 1031 |
| Link Distance (ft)    | 307 | 117 | 117 |     | 756  | 756  |
| Upstream Blk Time (%) | 29  |     |     |     | 9    | 15   |
| Queuing Penalty (veh) | 0   |     |     |     | 82   | 134  |
| Storage Bay Dist (ft) |     |     |     | 400 |      |      |
| Storage Blk Time (%)  |     |     |     |     | 23   |      |
| Queuing Penalty (veh) |     |     |     |     | 4    |      |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LTR | LTR | L   | T   | TR  |
| Maximum Queue (ft)    | 231 | 26  | 101 | 166 | 153 |
| Average Queue (ft)    | 124 | 1   | 35  | 74  | 98  |
| 95th Queue (ft)       | 282 | 10  | 76  | 173 | 192 |
| Link Distance (ft)    | 266 | 346 |     | 117 | 117 |
| Upstream Blk Time (%) | 15  |     |     | 5   | 22  |
| Queuing Penalty (veh) | 0   |     |     | 45  | 211 |
| Storage Bay Dist (ft) |     |     | 300 |     |     |
| Storage Blk Time (%)  |     |     |     | 10  |     |
| Queuing Penalty (veh) |     |     |     | 0   |     |

Queuing and Blocking Report  
PM 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | NB  | SB  | SB   | SB   |
|-----------------------|-----|-----|-----|------|------|
| Directions Served     | LR  | TR  | L   | T    | T    |
| Maximum Queue (ft)    | 300 | 3   | 424 | 784  | 770  |
| Average Queue (ft)    | 79  | 0   | 105 | 574  | 605  |
| 95th Queue (ft)       | 250 | 3   | 357 | 1063 | 1078 |
| Link Distance (ft)    | 511 | 896 |     | 750  | 750  |
| Upstream Blk Time (%) | 1   |     |     | 6    | 17   |
| Queuing Penalty (veh) | 0   |     |     | 53   | 168  |
| Storage Bay Dist (ft) |     |     | 400 |      |      |
| Storage Blk Time (%)  |     |     | 0   | 4    |      |
| Queuing Penalty (veh) |     |     | 1   | 1    |      |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  | SB   |
|-----------------------|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------|
| Directions Served     | L   | LT  | LT  | T   | R   | L   | T    | T    | R   | L   | T   | T    |
| Maximum Queue (ft)    | 498 | 452 | 371 | 325 | 119 | 606 | 890  | 870  | 171 | 302 | 891 | 917  |
| Average Queue (ft)    | 311 | 279 | 253 | 200 | 24  | 582 | 777  | 717  | 9   | 87  | 313 | 847  |
| 95th Queue (ft)       | 437 | 396 | 350 | 318 | 83  | 703 | 1136 | 1111 | 76  | 185 | 677 | 1082 |
| Link Distance (ft)    | 794 | 794 | 477 | 477 | 477 |     | 844  | 844  |     |     | 896 | 896  |
| Upstream Blk Time (%) |     |     |     |     |     |     | 80   | 10   |     |     | 0   | 10   |
| Queuing Penalty (veh) |     |     |     |     |     |     | 0    | 0    |     |     | 1   | 98   |
| Storage Bay Dist (ft) |     |     |     |     |     | 581 |      |      | 180 | 400 |     |      |
| Storage Blk Time (%)  |     |     |     |     |     | 84  | 2    | 12   |     |     | 1   | 8    |
| Queuing Penalty (veh) |     |     |     |     |     | 293 | 6    | 4    |     |     | 1   | 88   |

Intersection: 22: Shirley Ave/Broadview Ave & Frost/Waterloo St

| Movement              | SB  |
|-----------------------|-----|
| Directions Served     | R   |
| Maximum Queue (ft)    | 203 |
| Average Queue (ft)    | 202 |
| 95th Queue (ft)       | 228 |
| Link Distance (ft)    |     |
| Upstream Blk Time (%) |     |
| Queuing Penalty (veh) |     |
| Storage Bay Dist (ft) | 178 |
| Storage Blk Time (%)  | 40  |
| Queuing Penalty (veh) | 145 |

Network Summary

Network wide Queuing Penalty: 1617

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 183                                                                               | 80                                                                                | 319                                                                               | 115                                                                               | 132                                                                               | 68                                                                                | 404                                                                                 | 1182                                                                                | 68                                                                                  | 97                                                                                  | 1332                                                                                | 114                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                                | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1735                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                                | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 199                                                                               | 87                                                                                | 347                                                                               | 125                                                                               | 143                                                                               | 74                                                                                | 439                                                                                 | 1285                                                                                | 74                                                                                  | 105                                                                                 | 1448                                                                                | 124                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 26                                                                                  |
| Lane Group Flow (vph)             | 141                                                                               | 145                                                                               | 347                                                                               | 125                                                                               | 143                                                                               | 74                                                                                | 439                                                                                 | 1357                                                                                | 0                                                                                   | 105                                                                                 | 1448                                                                                | 98                                                                                  |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                                | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                   | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 18.2                                                                              | 18.2                                                                              | 150.0                                                                             | 16.8                                                                              | 16.8                                                                              | 150.0                                                                             | 24.4                                                                                | 80.8                                                                                |                                                                                     | 14.2                                                                                | 70.6                                                                                | 88.8                                                                                |
| Effective Green, g (s)            | 18.2                                                                              | 18.2                                                                              | 150.0                                                                             | 16.8                                                                              | 16.8                                                                              | 150.0                                                                             | 24.4                                                                                | 80.8                                                                                |                                                                                     | 14.2                                                                                | 70.6                                                                                | 88.8                                                                                |
| Actuated g/C Ratio                | 0.12                                                                              | 0.12                                                                              | 1.00                                                                              | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.16                                                                                | 0.54                                                                                |                                                                                     | 0.09                                                                                | 0.47                                                                                | 0.59                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 203                                                                               | 210                                                                               | 1583                                                                              | 198                                                                               | 208                                                                               | 1583                                                                              | 558                                                                                 | 1890                                                                                |                                                                                     | 167                                                                                 | 1665                                                                                | 937                                                                                 |
| v/s Ratio Prot                    | c0.08                                                                             | 0.08                                                                              |                                                                                   | 0.07                                                                              | c0.08                                                                             |                                                                                   | c0.13                                                                               | 0.39                                                                                |                                                                                     | 0.06                                                                                | c0.41                                                                               | 0.01                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.05                                                                                |
| v/c Ratio                         | 0.69                                                                              | 0.69                                                                              | 0.22                                                                              | 0.63                                                                              | 0.69                                                                              | 0.05                                                                              | 0.79                                                                                | 0.72                                                                                |                                                                                     | 0.63                                                                                | 0.87                                                                                | 0.10                                                                                |
| Uniform Delay, d1                 | 63.2                                                                              | 63.2                                                                              | 0.0                                                                               | 63.6                                                                              | 64.1                                                                              | 0.0                                                                               | 60.3                                                                                | 26.0                                                                                |                                                                                     | 65.4                                                                                | 35.6                                                                                | 13.3                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 9.9                                                                               | 9.4                                                                               | 0.3                                                                               | 6.4                                                                               | 9.1                                                                               | 0.1                                                                               | 7.2                                                                                 | 2.4                                                                                 |                                                                                     | 7.2                                                                                 | 6.5                                                                                 | 0.0                                                                                 |
| Delay (s)                         | 73.1                                                                              | 72.6                                                                              | 0.3                                                                               | 70.1                                                                              | 73.2                                                                              | 0.1                                                                               | 67.5                                                                                | 28.4                                                                                |                                                                                     | 72.6                                                                                | 42.1                                                                                | 13.4                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                   | C                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 33.1                                                                              |                                                                                   |                                                                                   | 56.2                                                                              |                                                                                   |                                                                                     | 38.0                                                                                |                                                                                     |                                                                                     | 41.9                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 40.1                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 79.1%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview & Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 5                                                                                 | 1                                                                                 | 125                                                                               | 8                                                                                 | 0                                                                                 | 45                                                                                | 160                                                                                 | 1572                                                                                | 36                                                                                  | 51                                                                                  | 1728                                                                                | 28                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 5                                                                                 | 1                                                                                 | 136                                                                               | 9                                                                                 | 0                                                                                 | 49                                                                                | 174                                                                                 | 1709                                                                                | 39                                                                                  | 55                                                                                  | 1878                                                                                | 30                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              |                                                                                   | 0.62                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3255                                                                              | 4100                                                                              | 954                                                                               | 3262                                                                              | 4096                                                                              | 874                                                                               | 1909                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3410                                                                              | 4764                                                                              | 0                                                                                 | 3421                                                                              | 4757                                                                              | 874                                                                               | 1250                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 0                                                                                 | 80                                                                                | 0                                                                                 | 100                                                                               | 83                                                                                | 50                                                                                  |                                                                                     |                                                                                     | 84                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 676                                                                               | 0                                                                                 | 0                                                                                 | 293                                                                               | 345                                                                                 |                                                                                     |                                                                                     | 355                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 142                                                                               | 58                                                                                | 174                                                                               | 1139                                                                              | 609                                                                               | 55                                                                                | 1252                                                                                | 657                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 5                                                                                 | 9                                                                                 | 174                                                                               | 0                                                                                 | 0                                                                                 | 55                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 136                                                                               | 49                                                                                | 0                                                                                 | 0                                                                                 | 39                                                                                | 0                                                                                 | 0                                                                                   | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 12                                                                                | 0                                                                                 | 345                                                                               | 1700                                                                              | 1700                                                                              | 355                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 12.16                                                                             | Err                                                                               | 0.50                                                                              | 0.67                                                                              | 0.36                                                                              | 0.16                                                                              | 0.74                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | Err                                                                               | 68                                                                                | 0                                                                                 | 0                                                                                 | 14                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | Err                                                                               | 25.6                                                                              | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | Err                                                                               | 2.3                                                                               |                                                                                   |                                                                                   | 0.5                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | Err                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 76.2%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 9: Brodview Ave/Broadview & Chappell St

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 10                                                                                | 1740                                                                              | 5                                                                                 | 42                                                                                | 1823                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 11                                                                                | 1891                                                                              | 5                                                                                 | 46                                                                                | 1982                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2976                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2976                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 54                                                                                | 96                                                                                |                                                                                   |                                                                                   | 85                                                                                |                                                                                   |
| cM capacity (veh/h)               | 9                                                                                 | 261                                                                               |                                                                                   |                                                                                   | 311                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 15                                                                                | 1261                                                                              | 636                                                                               | 46                                                                                | 991                                                                               | 991                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 46                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 11                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 30                                                                                | 1700                                                                              | 1700                                                                              | 311                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.50                                                                              | 0.74                                                                              | 0.37                                                                              | 0.15                                                                              | 0.58                                                                              | 0.58                                                                              |
| Queue Length 95th (ft)            | 41                                                                                | 0                                                                                 | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 211.4                                                                             | 0.0                                                                               | 0.0                                                                               | 18.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 211.4                                                                             | 0.0                                                                               |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 60.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Stuyvesant St & Brodview Ave

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 9                                                                                 | 9                                                                                 | 1666                                                                              | 10                                                                                | 20                                                                                | 1861                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 10                                                                                | 10                                                                                | 1811                                                                              | 11                                                                                | 22                                                                                | 2023                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2871                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2871                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 20                                                                                | 96                                                                                |                                                                                   |                                                                                   | 93                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 277                                                                               |                                                                                   |                                                                                   | 332                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 20                                                                                | 1207                                                                              | 614                                                                               | 22                                                                                | 1011                                                                              | 1011                                                                              |
| Volume Left                       | 10                                                                                | 0                                                                                 | 0                                                                                 | 22                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 10                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 23                                                                                | 1700                                                                              | 1700                                                                              | 332                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.84                                                                              | 0.71                                                                              | 0.36                                                                              | 0.07                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 62                                                                                | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 365.9                                                                             | 0.0                                                                               | 0.0                                                                               | 16.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 365.9                                                                             | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |



# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |                                                                                     |                                                                                     |  |  |
| Volume (veh/h)                    | 18                                                                                | 1                                                                                 | 19                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 37                                                                                  | 1656                                                                                | 0                                                                                   | 0                                                                                   | 1870                                                                                | 23                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 20                                                                                | 1                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 40                                                                                  | 1800                                                                                | 0                                                                                   | 0                                                                                   | 2033                                                                                | 25                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3013                                                                              | 3913                                                                              | 1016                                                                              | 2918                                                                              | 3938                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3013                                                                              | 3913                                                                              | 1016                                                                              | 2918                                                                              | 3938                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 0                                                                                 | 61                                                                                | 91                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 85                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 5                                                                                 | 3                                                                                 | 236                                                                               | 4                                                                                 | 3                                                                                 | 282                                                                               | 269                                                                                 |                                                                                     |                                                                                     | 339                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 41                                                                                | 0                                                                                 | 40                                                                                | 1200                                                                              | 600                                                                               | 678                                                                               | 1355                                                                                | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 20                                                                                | 0                                                                                 | 40                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 10                                                                                | 1700                                                                              | 269                                                                               | 1700                                                                              | 1700                                                                              | 339                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 4.31                                                                              | 0.00                                                                              | 0.15                                                                              | 0.71                                                                              | 0.35                                                                              | 0.00                                                                              | 0.80                                                                                | 0.01                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | Err                                                                               | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | Err                                                                               | 0.0                                                                               | 20.7                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | Err                                                                               | 0.0                                                                               | 0.5                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 105.1                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 61.7%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 3                                                                                 | 53                                                                                | 1585                                                                              | 14                                                                                | 29                                                                                | 1975                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 3                                                                                 | 58                                                                                | 1723                                                                              | 15                                                                                | 32                                                                                | 2147                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              |                                                                                   |                                                                                   | 0.87                                                                              |                                                                                   |
| vC, conflicting volume            | 2867                                                                              | 869                                                                               |                                                                                   |                                                                                   | 1738                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2847                                                                              | 550                                                                               |                                                                                   |                                                                                   | 1549                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 70                                                                                | 86                                                                                |                                                                                   |                                                                                   | 91                                                                                |                                                                                   |
| cM capacity (veh/h)               | 11                                                                                | 416                                                                               |                                                                                   |                                                                                   | 369                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 61                                                                                | 1149                                                                              | 589                                                                               | 32                                                                                | 1073                                                                              | 1073                                                                              |
| Volume Left                       | 3                                                                                 | 0                                                                                 | 0                                                                                 | 32                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 58                                                                                | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 138                                                                               | 1700                                                                              | 1700                                                                              | 369                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.44                                                                              | 0.68                                                                              | 0.35                                                                              | 0.09                                                                              | 0.63                                                                              | 0.63                                                                              |
| Queue Length 95th (ft)            | 49                                                                                | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 50.1                                                                              | 0.0                                                                               | 0.0                                                                               | 15.7                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 50.1                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 64.7%                                                                             |                                                                                   | ICU Level of Service                                                              | C                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Signalized Intersection Capacity Analysis

## 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |                                                                                   |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 804                                                                               | 140                                                                               | 189                                                                               | 49                                                                                | 168                                                                               | 193                                                                               | 265                                                                                | 637                                                                                 | 20                                                                                  | 207                                                                                 | 633                                                                                 | 1178                                                                                |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                              | 1.00                                                                              | 1.00                                                                               | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Flt Protected                     | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3500                                                                              | 1583                                                                              | 1770                                                                               | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1709                                                                              | 1583                                                                              |                                                                                   | 3500                                                                              | 1583                                                                              | 1770                                                                               | 3539                                                                                | 1583                                                                                | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 874                                                                               | 152                                                                               | 205                                                                               | 53                                                                                | 183                                                                               | 210                                                                               | 288                                                                                | 692                                                                                 | 22                                                                                  | 225                                                                                 | 688                                                                                 | 1280                                                                                |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 170                                                                               | 0                                                                                 | 0                                                                                 | 187                                                                               | 0                                                                                  | 0                                                                                   | 13                                                                                  | 0                                                                                   | 0                                                                                   | 256                                                                                 |
| Lane Group Flow (vph)             | 507                                                                               | 519                                                                               | 35                                                                                | 0                                                                                 | 236                                                                               | 23                                                                                | 288                                                                                | 692                                                                                 | 9                                                                                   | 225                                                                                 | 688                                                                                 | 1024                                                                                |
| Turn Type                         | Split                                                                             | NA                                                                                | Perm                                                                              | Split                                                                             | NA                                                                                | Perm                                                                              | Prot                                                                               | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  | Perm                                                                                |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                    |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 20.7                                                                              | 20.7                                                                              | 20.7                                                                              |                                                                                   | 13.3                                                                              | 13.3                                                                              | 12.0                                                                               | 50.5                                                                                | 50.5                                                                                | 19.5                                                                                | 58.0                                                                                | 58.0                                                                                |
| Effective Green, g (s)            | 20.7                                                                              | 20.7                                                                              | 20.7                                                                              |                                                                                   | 13.3                                                                              | 13.3                                                                              | 12.0                                                                               | 50.5                                                                                | 50.5                                                                                | 19.5                                                                                | 58.0                                                                                | 58.0                                                                                |
| Actuated g/C Ratio                | 0.17                                                                              | 0.17                                                                              | 0.17                                                                              |                                                                                   | 0.11                                                                              | 0.11                                                                              | 0.10                                                                               | 0.42                                                                                | 0.42                                                                                | 0.16                                                                                | 0.48                                                                                | 0.48                                                                                |
| Clearance Time (s)                | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 289                                                                               | 294                                                                               | 273                                                                               |                                                                                   | 387                                                                               | 175                                                                               | 177                                                                                | 1489                                                                                | 666                                                                                 | 287                                                                                 | 1710                                                                                | 765                                                                                 |
| v/s Ratio Prot                    | 0.30                                                                              | c0.30                                                                             |                                                                                   |                                                                                   | c0.07                                                                             |                                                                                   | c0.16                                                                              | 0.20                                                                                |                                                                                     | 0.13                                                                                | 0.19                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                    |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | c0.65                                                                               |
| v/c Ratio                         | 1.75                                                                              | 1.77                                                                              | 0.13                                                                              |                                                                                   | 0.61                                                                              | 0.13                                                                              | 1.63                                                                               | 0.46                                                                                | 0.01                                                                                | 0.78                                                                                | 0.40                                                                                | 1.34                                                                                |
| Uniform Delay, d1                 | 49.6                                                                              | 49.6                                                                              | 42.0                                                                              |                                                                                   | 50.9                                                                              | 48.1                                                                              | 54.0                                                                               | 25.0                                                                                | 20.2                                                                                | 48.2                                                                                | 19.9                                                                                | 31.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 353.4                                                                             | 358.0                                                                             | 0.2                                                                               |                                                                                   | 2.7                                                                               | 0.3                                                                               | 306.5                                                                              | 1.0                                                                                 | 0.0                                                                                 | 13.1                                                                                | 0.7                                                                                 | 161.3                                                                               |
| Delay (s)                         | 403.0                                                                             | 407.6                                                                             | 42.2                                                                              |                                                                                   | 53.6                                                                              | 48.5                                                                              | 360.5                                                                              | 26.1                                                                                | 20.3                                                                                | 61.3                                                                                | 20.6                                                                                | 192.3                                                                               |
| Level of Service                  | F                                                                                 | F                                                                                 | D                                                                                 |                                                                                   | D                                                                                 | D                                                                                 | F                                                                                  | C                                                                                   | C                                                                                   | E                                                                                   | C                                                                                   | F                                                                                   |
| Approach Delay (s)                |                                                                                   | 344.9                                                                             |                                                                                   |                                                                                   | 51.2                                                                              |                                                                                   |                                                                                    | 122.1                                                                               |                                                                                     |                                                                                     | 125.0                                                                               |                                                                                     |
| Approach LOS                      |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                    | F                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 173.2                                                                             |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.36                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 104.3%                                                                            |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
SAT 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R   | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 220 | 311 | 286 | 202 | 291 | 80  | 244 | 324 | 473 | 462 | 165 | 664 |
| Average Queue (ft)    | 115 | 182 | 116 | 99  | 137 | 41  | 110 | 148 | 201 | 211 | 116 | 563 |
| 95th Queue (ft)       | 233 | 266 | 240 | 175 | 245 | 101 | 220 | 297 | 395 | 408 | 192 | 743 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |     |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |     |     |     |     |     |     | 21  |
| Queuing Penalty (veh) |     |     |     |     |     |     |     |     |     |     |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55  | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 6   |     |     | 51  | 1   | 0   | 0   | 3   |     | 9   | 48  |
| Queuing Penalty (veh) | 0   | 5   |     |     | 34  | 1   | 0   | 0   | 12  |     | 58  | 47  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 652 | 220 |
| Average Queue (ft)    | 518 | 97  |
| 95th Queue (ft)       | 719 | 261 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 15  |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 38  | 0   |
| Queuing Penalty (veh) | 44  | 0   |

Intersection: 6: Broadview & Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|------|-----|-----|-----|
| Directions Served     | LTR | LTR | L   | TR   | L   | T   | TR  |
| Maximum Queue (ft)    | 338 | 189 | 157 | 16   | 202 | 456 | 520 |
| Average Queue (ft)    | 183 | 60  | 67  | 1    | 60  | 131 | 139 |
| 95th Queue (ft)       | 385 | 189 | 145 | 9    | 192 | 464 | 501 |
| Link Distance (ft)    | 329 | 466 |     | 1235 |     | 555 | 555 |
| Upstream Blk Time (%) | 31  | 1   |     |      |     | 0   | 4   |
| Queuing Penalty (veh) | 0   | 0   |     |      |     | 2   | 37  |
| Storage Bay Dist (ft) |     |     | 210 |      | 200 |     |     |
| Storage Blk Time (%)  |     |     | 0   |      |     | 18  |     |
| Queuing Penalty (veh) |     |     | 1   |      |     | 9   |     |

Queuing and Blocking Report  
SAT 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 9: Brodview Ave/Broadview & Chappell St

| Movement              | WB  | SB  | SB   | SB   |
|-----------------------|-----|-----|------|------|
| Directions Served     | LR  | L   | T    | T    |
| Maximum Queue (ft)    | 95  | 525 | 1244 | 1258 |
| Average Queue (ft)    | 24  | 226 | 776  | 749  |
| 95th Queue (ft)       | 80  | 637 | 1520 | 1527 |
| Link Distance (ft)    | 483 |     | 1235 | 1235 |
| Upstream Blk Time (%) |     |     | 5    | 3    |
| Queuing Penalty (veh) |     |     | 43   | 27   |
| Storage Bay Dist (ft) |     | 500 |      |      |
| Storage Blk Time (%)  |     | 0   | 56   |      |
| Queuing Penalty (veh) |     | 0   | 24   |      |

Intersection: 12: Stuyvesant St & Brodview Ave

| Movement              | WB  | SB  | SB   | SB   |
|-----------------------|-----|-----|------|------|
| Directions Served     | LR  | L   | T    | T    |
| Maximum Queue (ft)    | 254 | 424 | 808  | 822  |
| Average Queue (ft)    | 127 | 35  | 720  | 708  |
| 95th Queue (ft)       | 287 | 205 | 1055 | 1067 |
| Link Distance (ft)    | 307 |     | 756  | 756  |
| Upstream Blk Time (%) | 11  |     | 20   | 8    |
| Queuing Penalty (veh) | 0   |     | 184  | 77   |
| Storage Bay Dist (ft) |     | 400 |      |      |
| Storage Blk Time (%)  |     | 0   | 8    |      |
| Queuing Penalty (veh) |     | 1   | 2    |      |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | NB  | NB  | SB | SB  |
|-----------------------|-----|-----|-----|-----|----|-----|
| Directions Served     | LTR | L   | T   | TR  | LT | T   |
| Maximum Queue (ft)    | 260 | 299 | 688 | 636 | 9  | 31  |
| Average Queue (ft)    | 204 | 182 | 229 | 210 | 0  | 1   |
| 95th Queue (ft)       | 336 | 360 | 760 | 749 | 5  | 12  |
| Link Distance (ft)    | 254 |     | 750 | 750 |    | 117 |
| Upstream Blk Time (%) | 69  |     | 23  | 23  |    |     |
| Queuing Penalty (veh) | 0   |     | 187 | 188 |    |     |
| Storage Bay Dist (ft) |     | 300 |     |     | 50 |     |
| Storage Blk Time (%)  |     | 29  | 15  |     | 0  | 0   |
| Queuing Penalty (veh) |     | 238 | 5   |     | 0  | 0   |

Queuing and Blocking Report  
SAT 2040 No Build Restricted Left Turns

2/27/2015

Intersection: 16: Broadview Ave & Church St

| Movement              | WB  | NB  | NB  | SB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|
| Directions Served     | LR  | T   | TR  | L   | T   | T   |
| Maximum Queue (ft)    | 414 | 756 | 793 | 41  | 7   | 92  |
| Average Queue (ft)    | 162 | 187 | 196 | 11  | 0   | 7   |
| 95th Queue (ft)       | 424 | 771 | 809 | 36  | 6   | 59  |
| Link Distance (ft)    | 511 | 896 | 896 |     | 750 | 750 |
| Upstream Blk Time (%) | 7   | 17  | 17  |     |     |     |
| Queuing Penalty (veh) | 0   | 141 | 142 |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |     |     |
| Storage Blk Time (%)  |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |     |

Intersection: 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

| Movement              | EB  | EB  | EB  | WB  | WB  | WB  | NB  | NB   | NB   | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|
| Directions Served     | L   | LT  | R   | LT  | T   | R   | L   | T    | T    | R   | L   | T   |
| Maximum Queue (ft)    | 830 | 834 | 590 | 211 | 234 | 420 | 606 | 1238 | 1244 | 68  | 253 | 457 |
| Average Queue (ft)    | 789 | 788 | 446 | 129 | 82  | 89  | 537 | 906  | 872  | 4   | 138 | 152 |
| 95th Queue (ft)       | 903 | 910 | 864 | 214 | 245 | 329 | 747 | 1623 | 1616 | 48  | 224 | 291 |
| Link Distance (ft)    | 794 | 794 |     | 476 | 476 | 476 |     | 1210 | 1210 |     |     | 896 |
| Upstream Blk Time (%) | 69  | 85  |     |     | 4   | 9   |     | 49   | 24   |     |     |     |
| Queuing Penalty (veh) | 0   | 0   |     |     | 0   | 0   |     | 0    | 0    |     |     |     |
| Storage Bay Dist (ft) |     |     | 565 |     |     |     | 581 |      |      | 180 | 400 |     |
| Storage Blk Time (%)  |     | 85  | 0   |     |     |     | 70  | 9    | 18   | 0   |     |     |
| Queuing Penalty (veh) |     | 161 | 1   |     |     |     | 223 | 23   | 4    | 0   |     |     |

Intersection: 22: Shirley Ave/Broadview Ave & Foster /Waterloo St

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 791 | 203 |
| Average Queue (ft)    | 422 | 191 |
| 95th Queue (ft)       | 753 | 266 |
| Link Distance (ft)    | 896 |     |
| Upstream Blk Time (%) | 0   |     |
| Queuing Penalty (veh) | 1   |     |
| Storage Bay Dist (ft) |     | 178 |
| Storage Blk Time (%)  | 1   | 17  |
| Queuing Penalty (veh) | 7   | 55  |

Network Summary

Network wide Queuing Penalty: 1987

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 157                                                                               | 73                                                                                | 295                                                                               | 100                                                                               | 104                                                                               | 35                                                                                | 294                                                                                | 854                                                                                 | 38                                                                                  | 31                                                                                  | 573                                                                                 | 245                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1737                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1737                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3517                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 171                                                                               | 79                                                                                | 321                                                                               | 109                                                                               | 113                                                                               | 38                                                                                | 320                                                                                | 928                                                                                 | 41                                                                                  | 34                                                                                  | 623                                                                                 | 266                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 94                                                                                  |
| Lane Group Flow (vph)             | 123                                                                               | 127                                                                               | 321                                                                               | 109                                                                               | 113                                                                               | 38                                                                                | 320                                                                                | 967                                                                                 | 0                                                                                   | 34                                                                                  | 623                                                                                 | 172                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 17.0                                                                              | 17.0                                                                              | 150.0                                                                             | 14.5                                                                              | 14.5                                                                              | 150.0                                                                             | 19.3                                                                               | 91.1                                                                                |                                                                                     | 7.4                                                                                 | 79.2                                                                                | 96.2                                                                                |
| Effective Green, g (s)            | 17.0                                                                              | 17.0                                                                              | 150.0                                                                             | 14.5                                                                              | 14.5                                                                              | 150.0                                                                             | 19.3                                                                               | 91.1                                                                                |                                                                                     | 7.4                                                                                 | 79.2                                                                                | 96.2                                                                                |
| Actuated g/C Ratio                | 0.11                                                                              | 0.11                                                                              | 1.00                                                                              | 0.10                                                                              | 0.10                                                                              | 1.00                                                                              | 0.13                                                                               | 0.61                                                                                |                                                                                     | 0.05                                                                                | 0.53                                                                                | 0.64                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 190                                                                               | 196                                                                               | 1583                                                                              | 171                                                                               | 180                                                                               | 1583                                                                              | 441                                                                                | 2135                                                                                |                                                                                     | 87                                                                                  | 1868                                                                                | 1015                                                                                |
| v/s Ratio Prot                    | c0.07                                                                             | 0.07                                                                              |                                                                                   | c0.06                                                                             | 0.06                                                                              |                                                                                   | c0.09                                                                              | c0.28                                                                               |                                                                                     | 0.02                                                                                | 0.18                                                                                | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.02                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.09                                                                                |
| v/c Ratio                         | 0.65                                                                              | 0.65                                                                              | 0.20                                                                              | 0.64                                                                              | 0.63                                                                              | 0.02                                                                              | 0.73                                                                               | 0.45                                                                                |                                                                                     | 0.39                                                                                | 0.33                                                                                | 0.17                                                                                |
| Uniform Delay, d1                 | 63.6                                                                              | 63.6                                                                              | 0.0                                                                               | 65.2                                                                              | 65.2                                                                              | 0.0                                                                               | 62.8                                                                               | 16.0                                                                                |                                                                                     | 69.1                                                                                | 20.3                                                                                | 10.8                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.40                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 7.4                                                                               | 7.2                                                                               | 0.3                                                                               | 7.6                                                                               | 6.7                                                                               | 0.0                                                                               | 4.9                                                                                | 0.6                                                                                 |                                                                                     | 2.9                                                                                 | 0.5                                                                                 | 0.1                                                                                 |
| Delay (s)                         | 71.0                                                                              | 70.8                                                                              | 0.3                                                                               | 72.8                                                                              | 71.8                                                                              | 0.0                                                                               | 64.6                                                                               | 23.0                                                                                |                                                                                     | 72.0                                                                                | 20.8                                                                                | 10.9                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                  | C                                                                                   |                                                                                     | E                                                                                   | C                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 31.2                                                                              |                                                                                   |                                                                                   | 61.7                                                                              |                                                                                   |                                                                                    | 33.3                                                                                |                                                                                     |                                                                                     | 19.8                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 31.2                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.9%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |  |  |                                                                                     |  |  |  |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 104                                                                               | 0                                                                                 | 0                                                                                 | 16                                                                                | 184                                                                                 | 1109                                                                                | 11                                                                                  | 25                                                                                  | 844                                                                                 | 31                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 113                                                                               | 0                                                                                 | 0                                                                                 | 17                                                                                | 200                                                                                 | 1205                                                                                | 12                                                                                  | 27                                                                                  | 917                                                                                 | 34                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              |                                                                                   | 0.91                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 2009                                                                              | 2606                                                                              | 476                                                                               | 2238                                                                              | 2617                                                                              | 609                                                                               | 951                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1908                                                                              | 2566                                                                              | 218                                                                               | 2160                                                                              | 2578                                                                              | 609                                                                               | 742                                                                                 |                                                                                     |                                                                                     | 1217                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 84                                                                                | 100                                                                               | 100                                                                               | 96                                                                                | 74                                                                                  |                                                                                     |                                                                                     | 95                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 28                                                                                | 17                                                                                | 713                                                                               | 16                                                                                | 16                                                                                | 438                                                                               | 781                                                                                 |                                                                                     |                                                                                     | 569                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 113                                                                               | 17                                                                                | 200                                                                               | 804                                                                               | 414                                                                               | 27                                                                                | 612                                                                                 | 339                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 200                                                                               | 0                                                                                 | 0                                                                                 | 27                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 113                                                                               | 17                                                                                | 0                                                                                 | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                   | 34                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 713                                                                               | 438                                                                               | 781                                                                               | 1700                                                                              | 1700                                                                              | 569                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.16                                                                              | 0.04                                                                              | 0.26                                                                              | 0.47                                                                              | 0.24                                                                              | 0.05                                                                              | 0.36                                                                                | 0.20                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 14                                                                                | 3                                                                                 | 25                                                                                | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 11.0                                                                              | 13.6                                                                              | 11.2                                                                              | 0.0                                                                               | 0.0                                                                               | 11.6                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | B                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 11.0                                                                              | 13.6                                                                              | 1.6                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 1.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 41.2%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM Unsignalized Intersection Capacity Analysis

## 9: Broadview Ave & Chappell St

2/27/2015

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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 6                                                                                 | 1404                                                                              | 6                                                                                 | 9                                                                                 | 995                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   | 0%                                                                                | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 7                                                                                 | 1526                                                                              | 7                                                                                 | 10                                                                                | 1082                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2090                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2090                                                                              | 766                                                                               |                                                                                   |                                                                                   | 1533                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 95                                                                                | 98                                                                                |                                                                                   |                                                                                   | 98                                                                                |                                                                                   |
| cM capacity (veh/h)               | 44                                                                                | 345                                                                               |                                                                                   |                                                                                   | 430                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 9                                                                                 | 1017                                                                              | 515                                                                               | 10                                                                                | 541                                                                               | 541                                                                               |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 10                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 7                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 128                                                                               | 1700                                                                              | 1700                                                                              | 430                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.07                                                                              | 0.60                                                                              | 0.30                                                                              | 0.02                                                                              | 0.32                                                                              | 0.32                                                                              |
| Queue Length 95th (ft)            | 5                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 35.2                                                                              | 0.0                                                                               | 0.0                                                                               | 13.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 35.2                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.0%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Broadview Ave & Stuyvesant St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |  |
| Volume (veh/h)                    | 0                                                                                 | 3                                                                                 | 1450                                                                              | 18                                                                                | 10                                                                                | 967                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 0                                                                                 | 3                                                                                 | 1576                                                                              | 20                                                                                | 11                                                                                | 1051                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2133                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2133                                                                              | 798                                                                               |                                                                                   |                                                                                   | 1596                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 100                                                                               | 99                                                                                |                                                                                   |                                                                                   | 97                                                                                |                                                                                   |
| cM capacity (veh/h)               | 41                                                                                | 329                                                                               |                                                                                   |                                                                                   | 407                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 3                                                                                 | 1051                                                                              | 545                                                                               | 11                                                                                | 526                                                                               | 526                                                                               |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 3                                                                                 | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 329                                                                               | 1700                                                                              | 1700                                                                              | 407                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.01                                                                              | 0.62                                                                              | 0.32                                                                              | 0.03                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 1                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 16.1                                                                              | 0.0                                                                               | 0.0                                                                               | 14.1                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 16.1                                                                              | 0.0                                                                               |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 50.7%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |  |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 24                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 29                                                                                  | 1423                                                                                | 0                                                                                   | 0                                                                                   | 974                                                                                 | 13                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 32                                                                                  | 1547                                                                                | 0                                                                                   | 0                                                                                   | 1059                                                                                | 14                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1902                                                                              | 2676                                                                              | 536                                                                               | 2165                                                                              | 2683                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1902                                                                              | 2676                                                                              | 536                                                                               | 2165                                                                              | 2683                                                                              | 773                                                                               | 1073                                                                                |                                                                                     |                                                                                     | 1547                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 95                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 95                                                                                  |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 40                                                                                | 21                                                                                | 489                                                                               | 24                                                                                | 21                                                                                | 341                                                                               | 646                                                                                 |                                                                                     |                                                                                     | 425                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 26                                                                                | 0                                                                                 | 32                                                                                | 1031                                                                              | 516                                                                               | 0                                                                                 | 706                                                                                 | 367                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 32                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 14                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 489                                                                               | 1700                                                                              | 646                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.05                                                                              | 0.00                                                                              | 0.05                                                                              | 0.61                                                                              | 0.30                                                                              | 0.00                                                                              | 0.42                                                                                | 0.22                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 4                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 12.8                                                                              | 0.0                                                                               | 10.9                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | B                                                                                 | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 12.8                                                                              | 0.0                                                                               | 0.2                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 42.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 43                                                                                | 1364                                                                              | 11                                                                                | 32                                                                                | 960                                                                               |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 47                                                                                | 1483                                                                              | 12                                                                                | 35                                                                                | 1043                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.90                                                                              | 0.90                                                                              |                                                                                   |                                                                                   | 0.90                                                                              |                                                                                   |
| vC, conflicting volume            | 2080                                                                              | 747                                                                               |                                                                                   |                                                                                   | 1495                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 1977                                                                              | 496                                                                               |                                                                                   |                                                                                   | 1326                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 90                                                                                | 90                                                                                |                                                                                   |                                                                                   | 93                                                                                |                                                                                   |
| cM capacity (veh/h)               | 45                                                                                | 467                                                                               |                                                                                   |                                                                                   | 465                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 51                                                                                | 988                                                                               | 506                                                                               | 35                                                                                | 522                                                                               | 522                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 47                                                                                | 0                                                                                 | 12                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 260                                                                               | 1700                                                                              | 1700                                                                              | 465                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.20                                                                              | 0.58                                                                              | 0.30                                                                              | 0.07                                                                              | 0.31                                                                              | 0.31                                                                              |
| Queue Length 95th (ft)            | 18                                                                                | 0                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 22.2                                                                              | 0.0                                                                               | 0.0                                                                               | 13.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 22.2                                                                              | 0.0                                                                               |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.6                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 48.1%                                                                             |                                                                                   | ICU Level of Service                                                              | A                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

Queuing and Blocking Report  
AM 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 198 | 251 | 103 | 172 | 228 | 80 | 238 | 308 | 402 | 388 | 164 | 273 |
| Average Queue (ft)    | 85  | 155 | 27  | 92  | 103 | 23 | 123 | 154 | 230 | 239 | 50  | 164 |
| 95th Queue (ft)       | 200 | 234 | 81  | 157 | 187 | 79 | 202 | 267 | 353 | 357 | 130 | 255 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     |     |     |     |     |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 3   |     |     | 44  | 0  |     | 0   | 2   |     | 0   | 15  |
| Queuing Penalty (veh) | 0   | 2   |     |     | 16  | 0  |     | 0   | 7   |     | 0   | 5   |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 239 | 166 |
| Average Queue (ft)    | 128 | 48  |
| 95th Queue (ft)       | 221 | 97  |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 1   | 0   |
| Queuing Penalty (veh) | 2   | 0   |

Intersection: 6: Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | R   | R   | L   | L   | TR  |
| Maximum Queue (ft)    | 96  | 34  | 136 | 54  | 125 |
| Average Queue (ft)    | 40  | 14  | 58  | 13  | 5   |
| 95th Queue (ft)       | 71  | 38  | 103 | 42  | 84  |
| Link Distance (ft)    | 329 | 466 |     |     | 555 |
| Upstream Blk Time (%) |     |     |     |     | 0   |
| Queuing Penalty (veh) |     |     |     |     | 0   |
| Storage Bay Dist (ft) |     |     | 210 | 200 |     |
| Storage Blk Time (%)  |     |     | 0   |     |     |
| Queuing Penalty (veh) |     |     | 0   |     |     |

Queuing and Blocking Report  
AM 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 9: Broadview Ave & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 35  | 33  |
| Average Queue (ft)    | 6   | 6   |
| 95th Queue (ft)       | 27  | 25  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Broadview Ave & Stuyvesant St

| Movement              | WB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | R   | T   | TR  | L   |
| Maximum Queue (ft)    | 25  | 17  | 6   | 36  |
| Average Queue (ft)    | 2   | 1   | 1   | 7   |
| 95th Queue (ft)       | 13  | 10  | 7   | 27  |
| Link Distance (ft)    | 306 | 122 | 122 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | R   | L   | T   | TR  |
| Maximum Queue (ft)    | 52  | 58  | 5   | 3   |
| Average Queue (ft)    | 20  | 16  | 0   | 0   |
| 95th Queue (ft)       | 48  | 46  | 4   | 3   |
| Link Distance (ft)    | 266 |     | 122 | 122 |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |     |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 312                                                                               | 85                                                                                | 342                                                                               | 150                                                                               | 164                                                                               | 40                                                                                | 358                                                                                | 1386                                                                                | 34                                                                                  | 71                                                                                  | 1340                                                                                | 133                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1720                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.97                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1720                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3526                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 339                                                                               | 92                                                                                | 372                                                                               | 163                                                                               | 178                                                                               | 43                                                                                | 389                                                                                | 1507                                                                                | 37                                                                                  | 77                                                                                  | 1457                                                                                | 145                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 33                                                                                  |
| Lane Group Flow (vph)             | 214                                                                               | 217                                                                               | 372                                                                               | 163                                                                               | 178                                                                               | 43                                                                                | 389                                                                                | 1543                                                                                | 0                                                                                   | 77                                                                                  | 1457                                                                                | 112                                                                                 |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 22.3                                                                              | 22.3                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                               | 85.1                                                                                |                                                                                     | 12.4                                                                                | 74.1                                                                                | 96.4                                                                                |
| Effective Green, g (s)            | 22.3                                                                              | 22.3                                                                              | 160.0                                                                             | 20.2                                                                              | 20.2                                                                              | 160.0                                                                             | 23.4                                                                               | 85.1                                                                                |                                                                                     | 12.4                                                                                | 74.1                                                                                | 96.4                                                                                |
| Actuated g/C Ratio                | 0.14                                                                              | 0.14                                                                              | 1.00                                                                              | 0.13                                                                              | 0.13                                                                              | 1.00                                                                              | 0.15                                                                               | 0.53                                                                                |                                                                                     | 0.08                                                                                | 0.46                                                                                | 0.60                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 234                                                                               | 239                                                                               | 1583                                                                              | 223                                                                               | 235                                                                               | 1583                                                                              | 502                                                                                | 1875                                                                                |                                                                                     | 137                                                                                 | 1638                                                                                | 1003                                                                                |
| v/s Ratio Prot                    | c0.13                                                                             | 0.13                                                                              |                                                                                   | 0.09                                                                              | c0.10                                                                             |                                                                                   | c0.11                                                                              | c0.44                                                                               |                                                                                     | 0.04                                                                                | c0.41                                                                               | 0.02                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   | 0.03                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.06                                                                                |
| v/c Ratio                         | 0.91                                                                              | 0.91                                                                              | 0.23                                                                              | 0.73                                                                              | 0.76                                                                              | 0.03                                                                              | 0.77                                                                               | 0.82                                                                                |                                                                                     | 0.56                                                                                | 0.89                                                                                | 0.11                                                                                |
| Uniform Delay, d1                 | 67.9                                                                              | 67.8                                                                              | 0.0                                                                               | 67.3                                                                              | 67.5                                                                              | 0.0                                                                               | 65.8                                                                               | 31.2                                                                                |                                                                                     | 71.2                                                                                | 39.2                                                                                | 13.6                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.04                                                                               | 0.97                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 36.3                                                                              | 34.2                                                                              | 0.3                                                                               | 11.6                                                                              | 13.0                                                                              | 0.0                                                                               | 6.3                                                                                | 3.6                                                                                 |                                                                                     | 5.2                                                                                 | 7.7                                                                                 | 0.0                                                                                 |
| Delay (s)                         | 104.2                                                                             | 102.0                                                                             | 0.3                                                                               | 78.9                                                                              | 80.6                                                                              | 0.0                                                                               | 74.8                                                                               | 33.9                                                                                |                                                                                     | 76.4                                                                                | 46.9                                                                                | 13.6                                                                                |
| Level of Service                  | F                                                                                 | F                                                                                 | A                                                                                 | E                                                                                 | F                                                                                 | A                                                                                 | E                                                                                  | C                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 55.5                                                                              |                                                                                   |                                                                                   | 70.9                                                                              |                                                                                   |                                                                                    | 42.1                                                                                |                                                                                     |                                                                                     | 45.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 47.8                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.86                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 160.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 83.4%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 157                                                                               | 0                                                                                 | 0                                                                                 | 13                                                                                | 154                                                                                 | 1686                                                                                | 23                                                                                  | 32                                                                                  | 1712                                                                                | 40                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 171                                                                               | 0                                                                                 | 0                                                                                 | 14                                                                                | 167                                                                                 | 1833                                                                                | 25                                                                                  | 35                                                                                  | 1861                                                                                | 43                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              |                                                                                   | 0.62                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3217                                                                              | 4145                                                                              | 952                                                                               | 3351                                                                              | 4154                                                                              | 929                                                                               | 1904                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3352                                                                              | 4851                                                                              | 0                                                                                 | 3567                                                                              | 4866                                                                              | 929                                                                               | 1228                                                                                |                                                                                     |                                                                                     | 1858                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 75                                                                                | 100                                                                               | 100                                                                               | 95                                                                                | 52                                                                                  |                                                                                     |                                                                                     | 89                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 671                                                                               | 1                                                                                 | 0                                                                                 | 269                                                                               | 348                                                                                 |                                                                                     |                                                                                     | 322                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 171                                                                               | 14                                                                                | 167                                                                               | 1222                                                                              | 636                                                                               | 35                                                                                | 1241                                                                                | 664                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 167                                                                               | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 171                                                                               | 14                                                                                | 0                                                                                 | 0                                                                                 | 25                                                                                | 0                                                                                 | 0                                                                                   | 43                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 671                                                                               | 269                                                                               | 348                                                                               | 1700                                                                              | 1700                                                                              | 322                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.25                                                                              | 0.05                                                                              | 0.48                                                                              | 0.72                                                                              | 0.37                                                                              | 0.11                                                                              | 0.73                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 25                                                                                | 4                                                                                 | 63                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 12.2                                                                              | 19.1                                                                              | 24.5                                                                              | 0.0                                                                               | 0.0                                                                               | 17.5                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | B                                                                                 | C                                                                                 | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 12.2                                                                              | 19.1                                                                              | 2.0                                                                               |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 1.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 65.0%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM Unsignalized Intersection Capacity Analysis

## 9: Broadview Ave & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 2                                                                                 | 8                                                                                 | 1674                                                                              | 5                                                                                 | 28                                                                                | 1849                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 2                                                                                 | 9                                                                                 | 1820                                                                              | 5                                                                                 | 30                                                                                | 2010                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2888                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2888                                                                              | 912                                                                               |                                                                                   |                                                                                   | 1825                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 81                                                                                | 97                                                                                |                                                                                   |                                                                                   | 91                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 276                                                                               |                                                                                   |                                                                                   | 331                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 11                                                                                | 1213                                                                              | 612                                                                               | 30                                                                                | 1005                                                                              | 1005                                                                              |
| Volume Left                       | 2                                                                                 | 0                                                                                 | 0                                                                                 | 30                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 9                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 49                                                                                | 1700                                                                              | 1700                                                                              | 331                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.22                                                                              | 0.71                                                                              | 0.36                                                                              | 0.09                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 18                                                                                | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 97.3                                                                              | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 97.3                                                                              | 0.0                                                                               |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.1%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Broadview Ave & Stuyvesant St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |  |
| Volume (veh/h)                    | 0                                                                                 | 14                                                                                | 1649                                                                              | 18                                                                                | 19                                                                                | 1885                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 0                                                                                 | 15                                                                                | 1792                                                                              | 20                                                                                | 21                                                                                | 2049                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2868                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2868                                                                              | 906                                                                               |                                                                                   |                                                                                   | 1812                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 100                                                                               | 95                                                                                |                                                                                   |                                                                                   | 94                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 279                                                                               |                                                                                   |                                                                                   | 335                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 15                                                                                | 1195                                                                              | 617                                                                               | 21                                                                                | 1024                                                                              | 1024                                                                              |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 0                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 15                                                                                | 0                                                                                 | 20                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 279                                                                               | 1700                                                                              | 1700                                                                              | 335                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.05                                                                              | 0.70                                                                              | 0.36                                                                              | 0.06                                                                              | 0.60                                                                              | 0.60                                                                              |
| Queue Length 95th (ft)            | 4                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 18.6                                                                              | 0.0                                                                               | 0.0                                                                               | 16.4                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 18.6                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.2%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 24                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 55                                                                                  | 1639                                                                                | 0                                                                                   | 0                                                                                   | 1907                                                                                | 57                                                                                  |
| Sign Control                      | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 26                                                                                | 0                                                                                 | 1                                                                                 | 0                                                                                 | 60                                                                                  | 1782                                                                                | 0                                                                                   | 0                                                                                   | 2073                                                                                | 62                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3115                                                                              | 4005                                                                              | 1067                                                                              | 2964                                                                              | 4036                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3115                                                                              | 4005                                                                              | 1067                                                                              | 2964                                                                              | 4036                                                                              | 891                                                                               | 2135                                                                                |                                                                                     |                                                                                     |                                                                                     | 1782                                                                                |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 88                                                                                | 100                                                                               | 47                                                                                | 100                                                                               | 76                                                                                  |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |
| cM capacity (veh/h)               | 2                                                                                 | 2                                                                                 | 218                                                                               | 5                                                                                 | 2                                                                                 | 286                                                                               | 250                                                                                 |                                                                                     |                                                                                     |                                                                                     | 344                                                                                 |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 26                                                                                | 1                                                                                 | 60                                                                                | 1188                                                                              | 594                                                                               | 0                                                                                 | 1382                                                                                | 753                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 60                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 26                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 62                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 218                                                                               | 2                                                                                 | 250                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.12                                                                              | 0.53                                                                              | 0.24                                                                              | 0.70                                                                              | 0.35                                                                              | 0.00                                                                              | 0.81                                                                                | 0.44                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 10                                                                                | 15                                                                                | 23                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 23.8                                                                              | 2332.2                                                                            | 23.8                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | C                                                                                 | F                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 23.8                                                                              | 2332.2                                                                            | 0.8                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | C                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 1.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 71.2%                                                                             | ICU Level of Service                                                              |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 66                                                                                | 1553                                                                              | 10                                                                                | 39                                                                                | 1972                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 72                                                                                | 1688                                                                              | 11                                                                                | 42                                                                                | 2143                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.81                                                                              | 0.81                                                                              |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |
| vC, conflicting volume            | 2850                                                                              | 849                                                                               |                                                                                   |                                                                                   | 1699                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2814                                                                              | 334                                                                               |                                                                                   |                                                                                   | 1387                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 58                                                                                | 87                                                                                |                                                                                   |                                                                                   | 89                                                                                |                                                                                   |
| cM capacity (veh/h)               | 10                                                                                | 534                                                                               |                                                                                   |                                                                                   | 395                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 76                                                                                | 1125                                                                              | 574                                                                               | 42                                                                                | 1072                                                                              | 1072                                                                              |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 42                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 72                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 137                                                                               | 1700                                                                              | 1700                                                                              | 395                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.56                                                                              | 0.66                                                                              | 0.34                                                                              | 0.11                                                                              | 0.63                                                                              | 0.63                                                                              |
| Queue Length 95th (ft)            | 69                                                                                | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 60.1                                                                              | 0.0                                                                               | 0.0                                                                               | 15.2                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 60.1                                                                              | 0.0                                                                               |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   | 1.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   | 65.5%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   | C                                                                                 |
| Analysis Period (min)             |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

Queuing and Blocking Report  
PM 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 225 | 477 | 313 | 265 | 342 | 80 | 278 | 324 | 526 | 528 | 165 | 662 |
| Average Queue (ft)    | 187 | 275 | 130 | 145 | 168 | 26 | 156 | 211 | 305 | 318 | 85  | 535 |
| 95th Queue (ft)       | 264 | 413 | 254 | 236 | 288 | 81 | 246 | 348 | 482 | 490 | 162 | 741 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     | 0   | 0   |     | 15  |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     | 1   | 1   |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 2   | 30  |     |     | 58  | 0  | 0   | 0   | 7   |     | 3   | 45  |
| Queuing Penalty (veh) | 6   | 47  |     |     | 23  | 1  | 0   | 0   | 23  |     | 22  | 32  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 657 | 220 |
| Average Queue (ft)    | 534 | 92  |
| 95th Queue (ft)       | 748 | 262 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 17  |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 41  | 0   |
| Queuing Penalty (veh) | 54  | 0   |

Intersection: 6: Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | NB   | SB  | SB  |
|-----------------------|-----|-----|-----|------|------|-----|-----|
| Directions Served     | R   | R   | L   | T    | TR   | L   | TR  |
| Maximum Queue (ft)    | 183 | 49  | 213 | 186  | 93   | 63  | 68  |
| Average Queue (ft)    | 93  | 14  | 104 | 9    | 4    | 23  | 4   |
| 95th Queue (ft)       | 166 | 40  | 190 | 88   | 51   | 55  | 37  |
| Link Distance (ft)    | 329 | 466 |     | 1235 | 1235 |     | 555 |
| Upstream Blk Time (%) |     |     |     |      |      |     |     |
| Queuing Penalty (veh) |     |     |     |      |      |     |     |
| Storage Bay Dist (ft) |     |     | 210 |      |      | 200 |     |
| Storage Blk Time (%)  |     |     | 2   | 0    |      |     |     |
| Queuing Penalty (veh) |     |     | 13  | 0    |      |     |     |

Queuing and Blocking Report  
PM 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 9: Broadview Ave & Chappell St

| Movement              | WB  | NB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LR  | TR  | L   |
| Maximum Queue (ft)    | 46  | 3   | 55  |
| Average Queue (ft)    | 10  | 0   | 16  |
| 95th Queue (ft)       | 38  | 0   | 43  |
| Link Distance (ft)    | 483 | 750 |     |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) |     |     | 500 |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

Intersection: 12: Broadview Ave & Stuyvesant St

| Movement              | WB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | R   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 41  | 16  | 3   | 55  | 15  |
| Average Queue (ft)    | 10  | 1   | 0   | 13  | 1   |
| 95th Queue (ft)       | 34  | 11  | 3   | 41  | 9   |
| Link Distance (ft)    | 306 | 122 | 122 |     | 750 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |     |
| Storage Blk Time (%)  |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | R   | LTR | L   | T   | TR  |
| Maximum Queue (ft)    | 63  | 37  | 114 | 28  | 50  |
| Average Queue (ft)    | 22  | 3   | 47  | 1   | 6   |
| 95th Queue (ft)       | 55  | 19  | 96  | 12  | 30  |
| Link Distance (ft)    | 266 | 346 |     | 122 | 122 |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     | 300 |     |     |
| Storage Blk Time (%)  |     |     |     | 0   |     |
| Queuing Penalty (veh) |     |     |     | 0   |     |

# HCM Signalized Intersection Capacity Analysis

## 3: Broadview Ave & Winchester St & Lee Hwy

2/27/2015

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |   |  |  |  |  |  |
| Volume (vph)                      | 189                                                                               | 80                                                                                | 319                                                                               | 132                                                                               | 132                                                                               | 68                                                                                | 404                                                                                | 1182                                                                                | 68                                                                                  | 97                                                                                  | 1332                                                                                | 114                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Lane Util. Factor                 | 0.95                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                               | 0.95                                                                                |                                                                                     | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                               | 0.99                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1681                                                                              | 1734                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.95                                                                              | 0.98                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 1681                                                                              | 1734                                                                              | 1583                                                                              | 1770                                                                              | 1863                                                                              | 1583                                                                              | 3433                                                                               | 3510                                                                                |                                                                                     | 1770                                                                                | 3539                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 205                                                                               | 87                                                                                | 347                                                                               | 143                                                                               | 143                                                                               | 74                                                                                | 439                                                                                | 1285                                                                                | 74                                                                                  | 105                                                                                 | 1448                                                                                | 124                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 2                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 26                                                                                  |
| Lane Group Flow (vph)             | 143                                                                               | 149                                                                               | 347                                                                               | 143                                                                               | 143                                                                               | 74                                                                                | 439                                                                                | 1357                                                                                | 0                                                                                   | 105                                                                                 | 1448                                                                                | 98                                                                                  |
| Turn Type                         | Split                                                                             | NA                                                                                | Free                                                                              | Split                                                                             | NA                                                                                | Free                                                                              | Prot                                                                               | NA                                                                                  |                                                                                     | Prot                                                                                | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 3                                                                                  | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   | 6                                                                                   |
| Permitted Phases                  |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |
| Actuated Green, G (s)             | 18.7                                                                              | 18.7                                                                              | 150.0                                                                             | 17.4                                                                              | 17.4                                                                              | 150.0                                                                             | 24.4                                                                               | 79.7                                                                                |                                                                                     | 14.2                                                                                | 69.5                                                                                | 88.2                                                                                |
| Effective Green, g (s)            | 18.7                                                                              | 18.7                                                                              | 150.0                                                                             | 17.4                                                                              | 17.4                                                                              | 150.0                                                                             | 24.4                                                                               | 79.7                                                                                |                                                                                     | 14.2                                                                                | 69.5                                                                                | 88.2                                                                                |
| Actuated g/C Ratio                | 0.12                                                                              | 0.12                                                                              | 1.00                                                                              | 0.12                                                                              | 0.12                                                                              | 1.00                                                                              | 0.16                                                                               | 0.53                                                                                |                                                                                     | 0.09                                                                                | 0.46                                                                                | 0.59                                                                                |
| Clearance Time (s)                | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                                | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |
| Lane Grp Cap (vph)                | 209                                                                               | 216                                                                               | 1583                                                                              | 205                                                                               | 216                                                                               | 1583                                                                              | 558                                                                                | 1864                                                                                |                                                                                     | 167                                                                                 | 1639                                                                                | 930                                                                                 |
| v/s Ratio Prot                    | 0.09                                                                              | c0.09                                                                             |                                                                                   | c0.08                                                                             | 0.08                                                                              |                                                                                   | c0.13                                                                              | 0.39                                                                                |                                                                                     | 0.06                                                                                | c0.41                                                                               | 0.01                                                                                |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.22                                                                              |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.05                                                                                |
| v/c Ratio                         | 0.68                                                                              | 0.69                                                                              | 0.22                                                                              | 0.70                                                                              | 0.66                                                                              | 0.05                                                                              | 0.79                                                                               | 0.73                                                                                |                                                                                     | 0.63                                                                                | 0.88                                                                                | 0.10                                                                                |
| Uniform Delay, d1                 | 62.8                                                                              | 62.9                                                                              | 0.0                                                                               | 63.8                                                                              | 63.5                                                                              | 0.0                                                                               | 60.3                                                                               | 26.9                                                                                |                                                                                     | 65.4                                                                                | 36.6                                                                                | 13.6                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 8.9                                                                               | 8.9                                                                               | 0.3                                                                               | 9.9                                                                               | 7.4                                                                               | 0.1                                                                               | 7.2                                                                                | 2.5                                                                                 |                                                                                     | 7.2                                                                                 | 7.3                                                                                 | 0.0                                                                                 |
| Delay (s)                         | 71.7                                                                              | 71.7                                                                              | 0.3                                                                               | 73.7                                                                              | 70.9                                                                              | 0.1                                                                               | 67.5                                                                               | 29.4                                                                                |                                                                                     | 72.6                                                                                | 43.9                                                                                | 13.6                                                                                |
| Level of Service                  | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                 | E                                                                                 | A                                                                                 | E                                                                                  | C                                                                                   |                                                                                     | E                                                                                   | D                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 33.0                                                                              |                                                                                   |                                                                                   | 57.4                                                                              |                                                                                   |                                                                                    | 38.7                                                                                |                                                                                     |                                                                                     | 43.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 41.2                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.81                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 150.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 79.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Broadview Ave & Roebling St

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 125                                                                               | 0                                                                                 | 0                                                                                 | 45                                                                                | 160                                                                                 | 1572                                                                                | 36                                                                                  | 51                                                                                  | 1728                                                                                | 28                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 136                                                                               | 0                                                                                 | 0                                                                                 | 49                                                                                | 174                                                                                 | 1709                                                                                | 39                                                                                  | 55                                                                                  | 1878                                                                                | 30                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 618                                                                                 |                                                                                     |
| pX, platoon unblocked             | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              | 0.62                                                                              |                                                                                   | 0.62                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3255                                                                              | 4100                                                                              | 954                                                                               | 3262                                                                              | 4096                                                                              | 874                                                                               | 1909                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3412                                                                              | 4772                                                                              | 0                                                                                 | 3422                                                                              | 4765                                                                              | 874                                                                               | 1242                                                                                |                                                                                     |                                                                                     | 1748                                                                                |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 80                                                                                | 100                                                                               | 100                                                                               | 83                                                                                | 50                                                                                  |                                                                                     |                                                                                     | 84                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 1                                                                                 | 0                                                                                 | 673                                                                               | 1                                                                                 | 0                                                                                 | 293                                                                               | 345                                                                                 |                                                                                     |                                                                                     | 355                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 136                                                                               | 49                                                                                | 174                                                                               | 1139                                                                              | 609                                                                               | 55                                                                                | 1252                                                                                | 657                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 174                                                                               | 0                                                                                 | 0                                                                                 | 55                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 136                                                                               | 49                                                                                | 0                                                                                 | 0                                                                                 | 39                                                                                | 0                                                                                 | 0                                                                                   | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 673                                                                               | 293                                                                               | 345                                                                               | 1700                                                                              | 1700                                                                              | 355                                                                               | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.20                                                                              | 0.17                                                                              | 0.50                                                                              | 0.67                                                                              | 0.36                                                                              | 0.16                                                                              | 0.74                                                                                | 0.39                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 19                                                                                | 15                                                                                | 68                                                                                | 0                                                                                 | 0                                                                                 | 14                                                                                | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 11.7                                                                              | 19.7                                                                              | 25.5                                                                              | 0.0                                                                               | 0.0                                                                               | 17.0                                                                              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | B                                                                                 | C                                                                                 | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 11.7                                                                              | 19.7                                                                              | 2.3                                                                               |                                                                                   |                                                                                   | 0.5                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | B                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 1.9                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 64.2%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



# HCM Unsignalized Intersection Capacity Analysis

## 9: Broadview Ave & Chappell St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 4                                                                                 | 10                                                                                | 1740                                                                              | 5                                                                                 | 42                                                                                | 1823                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 4                                                                                 | 11                                                                                | 1891                                                                              | 5                                                                                 | 46                                                                                | 1982                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2976                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2976                                                                              | 948                                                                               |                                                                                   |                                                                                   | 1897                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 54                                                                                | 96                                                                                |                                                                                   |                                                                                   | 85                                                                                |                                                                                   |
| cM capacity (veh/h)               | 9                                                                                 | 261                                                                               |                                                                                   |                                                                                   | 311                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 15                                                                                | 1261                                                                              | 636                                                                               | 46                                                                                | 991                                                                               | 991                                                                               |
| Volume Left                       | 4                                                                                 | 0                                                                                 | 0                                                                                 | 46                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 11                                                                                | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 30                                                                                | 1700                                                                              | 1700                                                                              | 311                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.50                                                                              | 0.74                                                                              | 0.37                                                                              | 0.15                                                                              | 0.58                                                                              | 0.58                                                                              |
| Queue Length 95th (ft)            | 41                                                                                | 0                                                                                 | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 211.4                                                                             | 0.0                                                                               | 0.0                                                                               | 18.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 211.4                                                                             | 0.0                                                                               |                                                                                   | 0.4                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 1.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 60.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 12: Broadview Ave & Stuyvesant St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |  |
| Volume (veh/h)                    | 0                                                                                 | 9                                                                                 | 1666                                                                              | 10                                                                                | 20                                                                                | 1861                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 0                                                                                 | 10                                                                                | 1811                                                                              | 11                                                                                | 22                                                                                | 2023                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 2871                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2871                                                                              | 911                                                                               |                                                                                   |                                                                                   | 1822                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 100                                                                               | 96                                                                                |                                                                                   |                                                                                   | 93                                                                                |                                                                                   |
| cM capacity (veh/h)               | 12                                                                                | 277                                                                               |                                                                                   |                                                                                   | 332                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 10                                                                                | 1207                                                                              | 614                                                                               | 22                                                                                | 1011                                                                              | 1011                                                                              |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 0                                                                                 | 22                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 10                                                                                | 0                                                                                 | 11                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 277                                                                               | 1700                                                                              | 1700                                                                              | 332                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.04                                                                              | 0.71                                                                              | 0.36                                                                              | 0.07                                                                              | 0.59                                                                              | 0.59                                                                              |
| Queue Length 95th (ft)            | 3                                                                                 | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 18.5                                                                              | 0.0                                                                               | 0.0                                                                               | 16.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 18.5                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.4%                                                                             |                                                                                   | ICU Level of Service                                                              | B                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

# HCM Unsignalized Intersection Capacity Analysis

## 13: Broadview Ave & Gold Cup Dr/Private Residence

2/27/2015

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |                                                                                   |  |                                                                                   |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (veh/h)                    | 0                                                                                 | 0                                                                                 | 19                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 37                                                                                  | 1656                                                                                | 0                                                                                   | 0                                                                                   | 1870                                                                                | 23                                                                                  |
| Sign Control                      | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |                                                                                     |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 0                                                                                 | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 40                                                                                  | 1800                                                                                | 0                                                                                   | 0                                                                                   | 2033                                                                                | 25                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 3026                                                                              | 3926                                                                              | 1029                                                                              | 2917                                                                              | 3938                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 3026                                                                              | 3926                                                                              | 1029                                                                              | 2917                                                                              | 3938                                                                              | 900                                                                               | 2058                                                                                |                                                                                     |                                                                                     |                                                                                     | 1800                                                                                |                                                                                     |
| tC, single (s)                    | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 7.5                                                                               | 6.5                                                                               | 6.9                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |
| p0 queue free %                   | 100                                                                               | 100                                                                               | 91                                                                                | 100                                                                               | 100                                                                               | 100                                                                               | 85                                                                                  |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |
| cM capacity (veh/h)               | 5                                                                                 | 3                                                                                 | 231                                                                               | 6                                                                                 | 3                                                                                 | 282                                                                               | 269                                                                                 |                                                                                     |                                                                                     |                                                                                     | 339                                                                                 |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | NB 3                                                                              | SB 1                                                                              | SB 2                                                                                | SB 3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 21                                                                                | 0                                                                                 | 40                                                                                | 1200                                                                              | 600                                                                               | 0                                                                                 | 1355                                                                                | 703                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 0                                                                                 | 40                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 21                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 231                                                                               | 1700                                                                              | 269                                                                               | 1700                                                                              | 1700                                                                              | 1700                                                                              | 1700                                                                                | 1700                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.09                                                                              | 0.00                                                                              | 0.15                                                                              | 0.71                                                                              | 0.35                                                                              | 0.00                                                                              | 0.80                                                                                | 0.41                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 7                                                                                 | 0                                                                                 | 13                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 22.1                                                                              | 0.0                                                                               | 20.7                                                                              | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | C                                                                                 | A                                                                                 | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 22.1                                                                              | 0.0                                                                               | 0.5                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | C                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.4%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 16: Broadview Ave & Church St

2/27/2015

|                                   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | WBL                                                                               | WBR                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               |
| Lane Configurations               |  |                                                                                   |  |                                                                                   |  |  |
| Volume (veh/h)                    | 3                                                                                 | 53                                                                                | 1585                                                                              | 14                                                                                | 29                                                                                | 1975                                                                              |
| Sign Control                      | Stop                                                                              |                                                                                   | Free                                                                              |                                                                                   | Free                                                                              | Free                                                                              |
| Grade                             | 0%                                                                                |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 3                                                                                 | 58                                                                                | 1723                                                                              | 15                                                                                | 32                                                                                | 2147                                                                              |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       |                                                                                   |                                                                                   | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (ft)              |                                                                                   |                                                                                   | 976                                                                               |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             | 0.85                                                                              | 0.85                                                                              |                                                                                   |                                                                                   | 0.85                                                                              |                                                                                   |
| vC, conflicting volume            | 2867                                                                              | 869                                                                               |                                                                                   |                                                                                   | 1738                                                                              |                                                                                   |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 2844                                                                              | 495                                                                               |                                                                                   |                                                                                   | 1517                                                                              |                                                                                   |
| tC, single (s)                    | 6.8                                                                               | 6.9                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 3.5                                                                               | 3.3                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |
| p0 queue free %                   | 69                                                                                | 87                                                                                |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |
| cM capacity (veh/h)               | 11                                                                                | 442                                                                               |                                                                                   |                                                                                   | 371                                                                               |                                                                                   |
| Direction, Lane #                 | WB 1                                                                              | NB 1                                                                              | NB 2                                                                              | SB 1                                                                              | SB 2                                                                              | SB 3                                                                              |
| Volume Total                      | 61                                                                                | 1149                                                                              | 589                                                                               | 32                                                                                | 1073                                                                              | 1073                                                                              |
| Volume Left                       | 3                                                                                 | 0                                                                                 | 0                                                                                 | 32                                                                                | 0                                                                                 | 0                                                                                 |
| Volume Right                      | 58                                                                                | 0                                                                                 | 15                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| cSH                               | 139                                                                               | 1700                                                                              | 1700                                                                              | 371                                                                               | 1700                                                                              | 1700                                                                              |
| Volume to Capacity                | 0.44                                                                              | 0.68                                                                              | 0.35                                                                              | 0.08                                                                              | 0.63                                                                              | 0.63                                                                              |
| Queue Length 95th (ft)            | 49                                                                                | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 |
| Control Delay (s)                 | 49.5                                                                              | 0.0                                                                               | 0.0                                                                               | 15.6                                                                              | 0.0                                                                               | 0.0                                                                               |
| Lane LOS                          | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |
| Approach Delay (s)                | 49.5                                                                              | 0.0                                                                               |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   |
| Approach LOS                      | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   | 0.9                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 64.7%                                                                             |                                                                                   | ICU Level of Service                                                              | C                                                                                 |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |

Queuing and Blocking Report  
SAT 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | EB  | EB  | EB  | WB  | WB  | WB | NB  | NB  | NB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Directions Served     | L   | LT  | R   | L   | T   | R  | L   | L   | T   | TR  | L   | T   |
| Maximum Queue (ft)    | 217 | 274 | 285 | 232 | 289 | 80 | 281 | 324 | 516 | 513 | 165 | 668 |
| Average Queue (ft)    | 110 | 175 | 113 | 116 | 136 | 40 | 152 | 214 | 293 | 302 | 107 | 592 |
| 95th Queue (ft)       | 224 | 255 | 233 | 193 | 236 | 99 | 238 | 346 | 447 | 447 | 187 | 749 |
| Link Distance (ft)    |     | 634 | 634 | 607 | 607 |    |     |     | 555 | 555 |     | 626 |
| Upstream Blk Time (%) |     |     |     |     |     |    |     |     | 0   | 0   |     | 34  |
| Queuing Penalty (veh) |     |     |     |     |     |    |     |     | 0   | 0   |     | 0   |
| Storage Bay Dist (ft) | 200 |     |     |     |     | 55 | 300 | 300 |     |     | 140 |     |
| Storage Blk Time (%)  | 0   | 6   |     |     | 52  | 1  | 0   | 0   | 6   |     | 9   | 49  |
| Queuing Penalty (veh) | 0   | 5   |     |     | 35  | 1  | 0   | 3   | 26  |     | 61  | 48  |

Intersection: 3: Broadview Ave & Winchester St & Lee Hwy

| Movement              | SB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | T   | R   |
| Maximum Queue (ft)    | 665 | 220 |
| Average Queue (ft)    | 589 | 101 |
| 95th Queue (ft)       | 754 | 263 |
| Link Distance (ft)    | 626 |     |
| Upstream Blk Time (%) | 33  |     |
| Queuing Penalty (veh) | 0   |     |
| Storage Bay Dist (ft) |     | 195 |
| Storage Blk Time (%)  | 47  | 0   |
| Queuing Penalty (veh) | 54  | 0   |

Intersection: 6: Broadview Ave & Roebling St

| Movement              | EB  | WB  | NB  | NB   | NB   | SB  | SB  |
|-----------------------|-----|-----|-----|------|------|-----|-----|
| Directions Served     | R   | R   | L   | T    | TR   | L   | TR  |
| Maximum Queue (ft)    | 163 | 60  | 202 | 67   | 32   | 75  | 131 |
| Average Queue (ft)    | 74  | 26  | 97  | 3    | 1    | 29  | 6   |
| 95th Queue (ft)       | 130 | 52  | 176 | 44   | 10   | 62  | 87  |
| Link Distance (ft)    | 329 | 466 |     | 1235 | 1235 |     | 555 |
| Upstream Blk Time (%) |     |     |     |      |      |     | 0   |
| Queuing Penalty (veh) |     |     |     |      |      |     | 0   |
| Storage Bay Dist (ft) |     |     | 210 |      |      | 200 |     |
| Storage Blk Time (%)  |     |     | 1   | 0    |      |     |     |
| Queuing Penalty (veh) |     |     | 4   | 0    |      |     |     |

Queuing and Blocking Report  
SAT 2040 Proposed Restricted Left Turns

2/27/2015

Intersection: 9: Broadview Ave & Chappell St

| Movement              | WB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | LR  | L   |
| Maximum Queue (ft)    | 92  | 63  |
| Average Queue (ft)    | 24  | 23  |
| 95th Queue (ft)       | 78  | 55  |
| Link Distance (ft)    | 483 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 500 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

Intersection: 12: Broadview Ave & Stuyvesant St

| Movement              | WB  | NB  | NB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | R   | T   | TR  | L   |
| Maximum Queue (ft)    | 34  | 15  | 6   | 42  |
| Average Queue (ft)    | 7   | 1   | 0   | 11  |
| 95th Queue (ft)       | 28  | 8   | 5   | 35  |
| Link Distance (ft)    | 306 | 122 | 122 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 400 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Intersection: 13: Broadview Ave & Gold Cup Dr/Private Residence

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | R   | L   | T   | TR  |
| Maximum Queue (ft)    | 67  | 84  | 11  | 28  |
| Average Queue (ft)    | 18  | 28  | 0   | 2   |
| 95th Queue (ft)       | 46  | 68  | 9   | 15  |
| Link Distance (ft)    | 266 |     | 122 | 122 |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     | 300 |     |     |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

**APPENDIX M**  
**Traffic Studies –**  
**Proposed Improvements Concept Plans**

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TRAFFIC/ACCESS MANAGEMENT STUDY  
RECOMMENDED GEOMETRIC IMPROVEMENTS

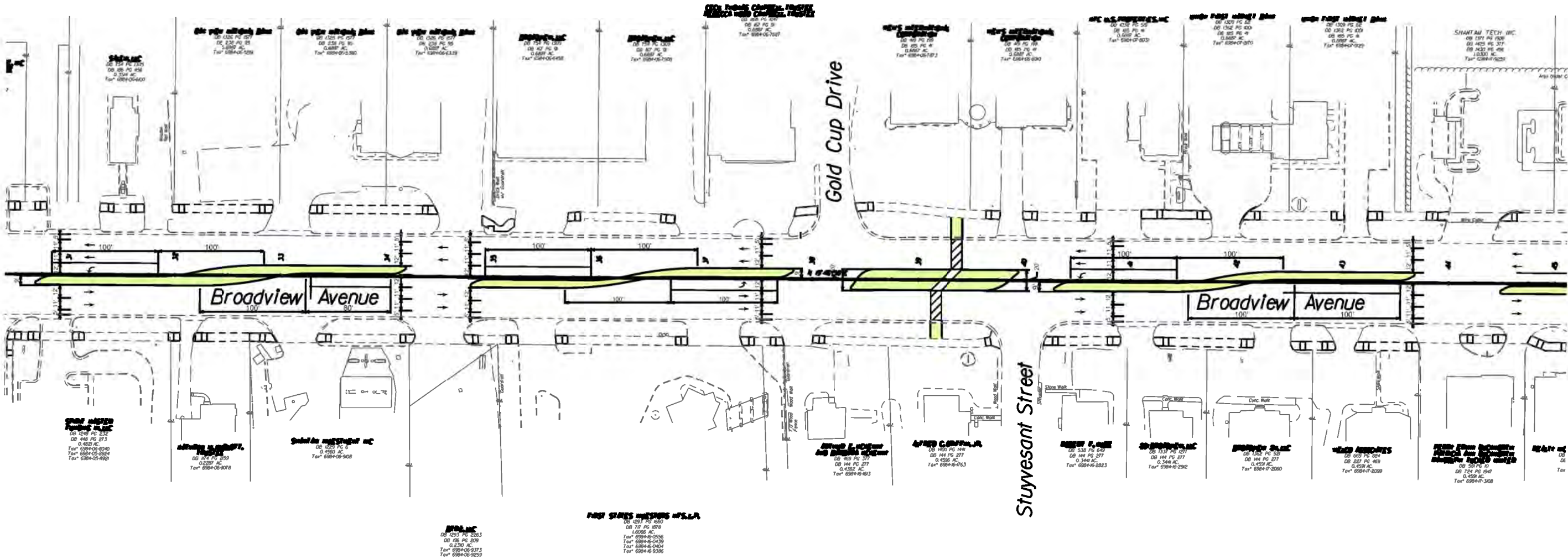




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DESIGN BY <Designer\_Name (0001.000-0000) (District)> -----  
SUBSURFACE UTILITY BY, DATE <Surveyor\_Name (0001.000-0000) (District)> -----

TRAFFIC ACCESS MANAGEMENT STUDY  
GOLD CUP DRIVE / STUYVESANT STREET  
INTERSECTION IMPROVEMENTS

|                                                                                                                                                          |                                                                               | REVISED | STATE | STATE               |                                  | SHEET NO. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------|-------|---------------------|----------------------------------|-----------|
|                                                                                                                                                          |                                                                               |         |       | ROUTE               | PROJECT                          |           |
|                                                                                                                                                          |                                                                               |         | VA.   | 7/29<br>BUS/<br>211 | 707-156-103, P101,<br>R210, C501 |           |
| DESIGN FEATURES RELATING TO CONSTRUCTION<br>OR TO REGULATION AND CONTROL OF TRAFFIC<br>MAY BE SUBJECT TO CHANGE AS DEEMED<br>NECESSARY BY THE DEPARTMENT |                                                                               |         |       |                     |                                  |           |
| VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE)                                                                            | VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE) |         |       |                     |                                  |           |

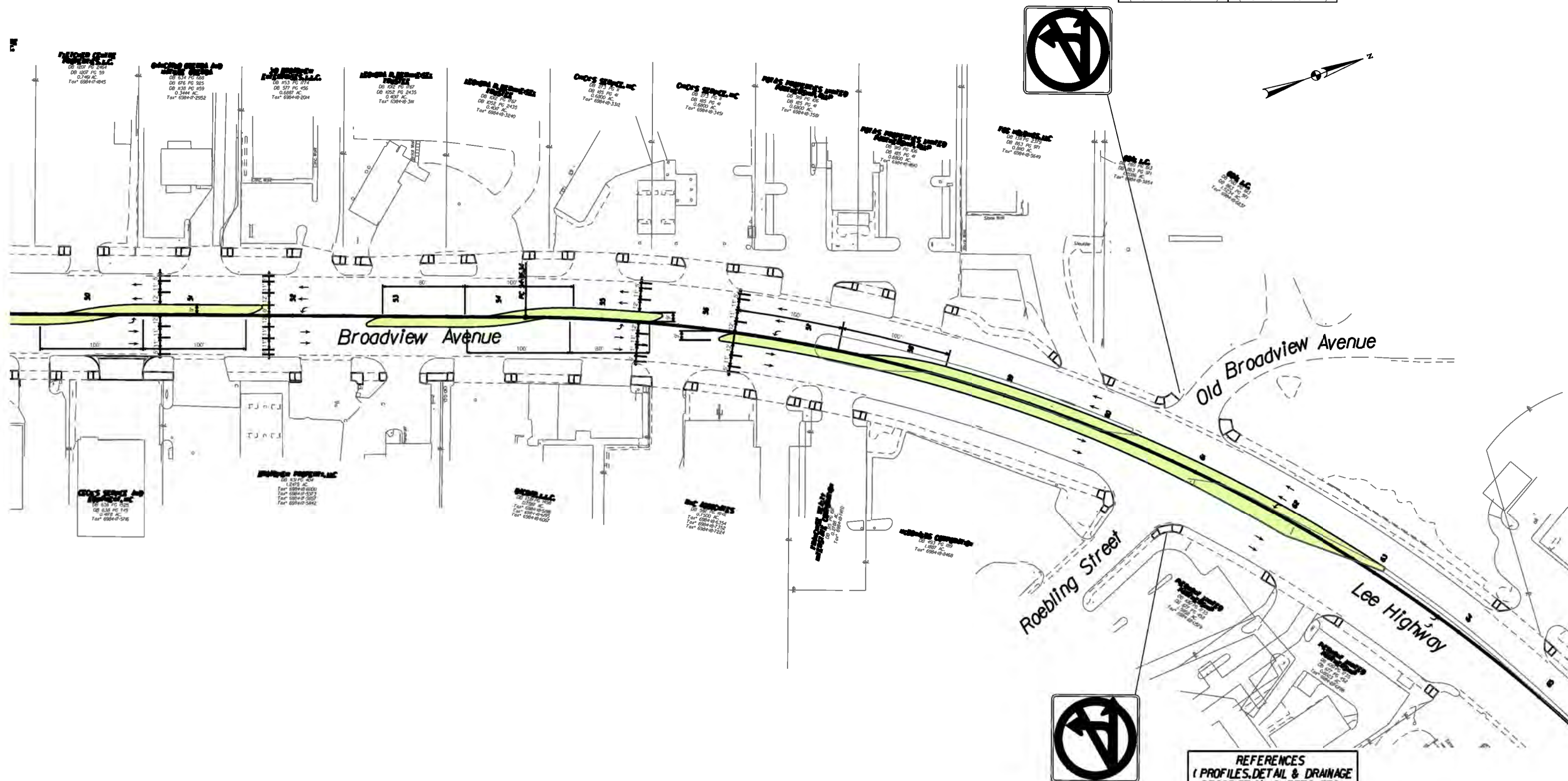


| REFERENCES<br>(PROFILES, DETAIL & DRAINAGE<br>DESCRIPTION SHEETS, ETC.) |    |
|-------------------------------------------------------------------------|----|
| Mainline Profile                                                        | 3A |
| Drainage Descr.                                                         |    |

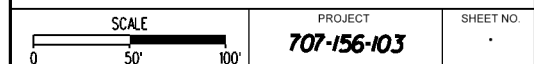
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SURVEYED BY, DATE <Surveyor\_Name (000) 000-0000 (District)> \_ \_ \_ \_  
DESIGN BY <Designer\_Name (000) 000-0000 (District)> \_ \_ \_ \_  
SUBSURFACE UTILITY BY, DATE <Surveyor\_Name (000) 000-0000 (District)> \_ \_ \_ \_

# TRAFFIC ACCESS MANAGEMENT STUDY OLD BROADVIEW AVENUE / ROEBLING STREET INTERSECTION IMPROVEMENTS - CLOSED MEDIAN

|                                                                               |                                                                               |                                                                                                                                                          |       |                      |                                  |           |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------|----------------------------------|-----------|
|                                                                               |                                                                               | REVISED                                                                                                                                                  | STATE | STATE                |                                  | SHEET NO. |
|                                                                               |                                                                               |                                                                                                                                                          |       | ROUTE                | PROJECT                          |           |
|                                                                               |                                                                               |                                                                                                                                                          | VA.   | 17/29<br>BUS/<br>211 | 707-156-103, P101,<br>R210, C501 |           |
|                                                                               |                                                                               | DESIGN FEATURES RELATING TO CONSTRUCTION<br>OR TO REGULATION AND CONTROL OF TRAFFIC<br>MAY BE SUBJECT TO CHANGE AS DEEMED<br>NECESSARY BY THE DEPARTMENT |       |                      |                                  |           |
| VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE) | VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE) |                                                                                                                                                          |       |                      |                                  |           |



| REFERENCES<br>(PROFILES, DETAIL & DRAINAGE<br>DESCRIPTION SHEETS, ETC.) |    |
|-------------------------------------------------------------------------|----|
| Mainline Profile                                                        | JA |
| Drainage Descr.                                                         |    |

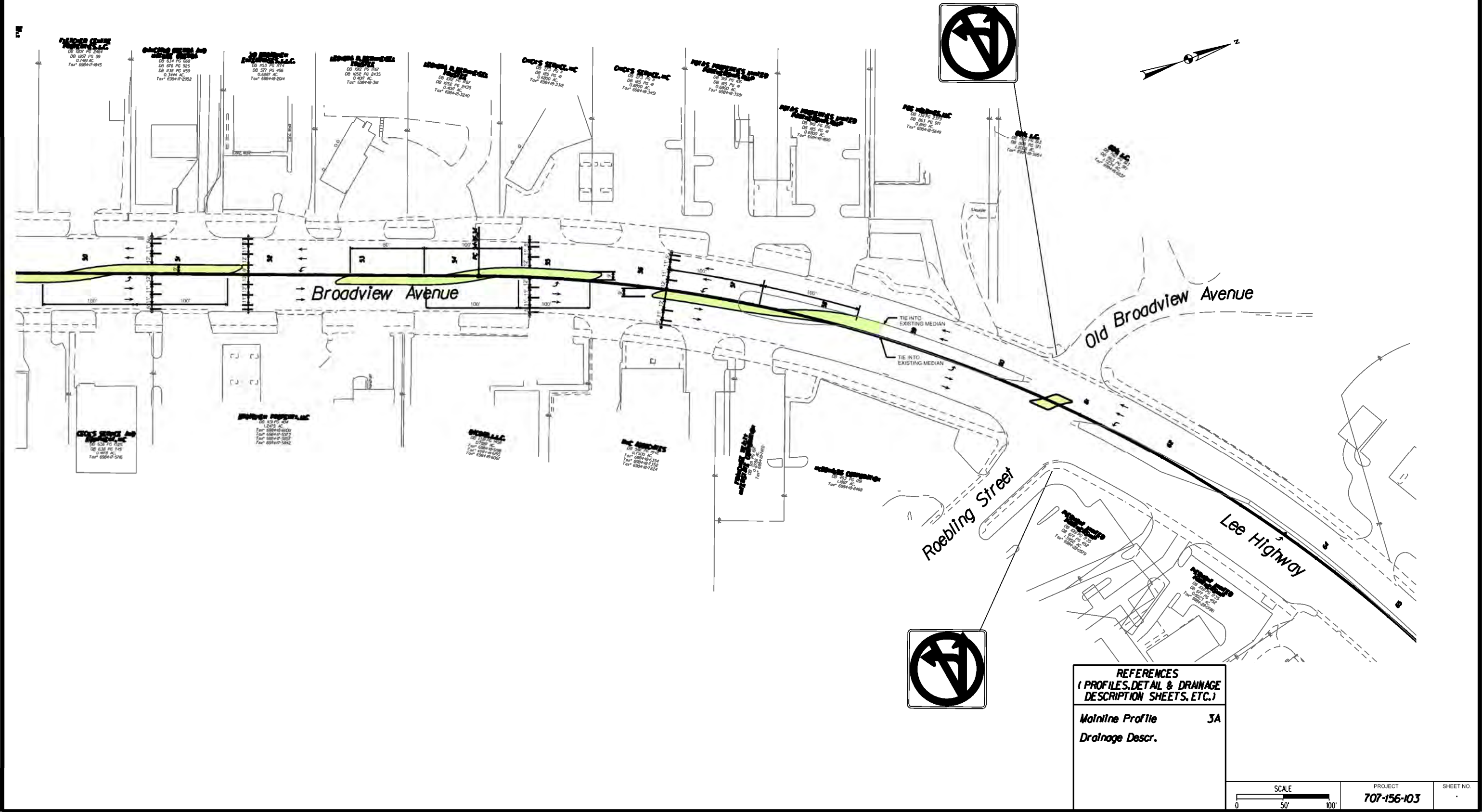




PROJECT MANAGER: *Project Mgr Name (0001.000-0000 (District))* -----  
SURVEYED BY, DATE: *Surveyor Name (0001.000-0000 (District))* -----  
DESIGN BY: *Designer Name (0001.000-0000 (District))* -----  
SUBSURFACE UTILITY BY, DATE: *Surveyor Name (0001.000-0000 (District))* -----

# TRAFFIC ACCESS MANAGEMENT STUDY OLD BROADVIEW AVENUE / ROEBLING STREET INTERSECTION IMPROVEMENTS - LIMITED ACCESS

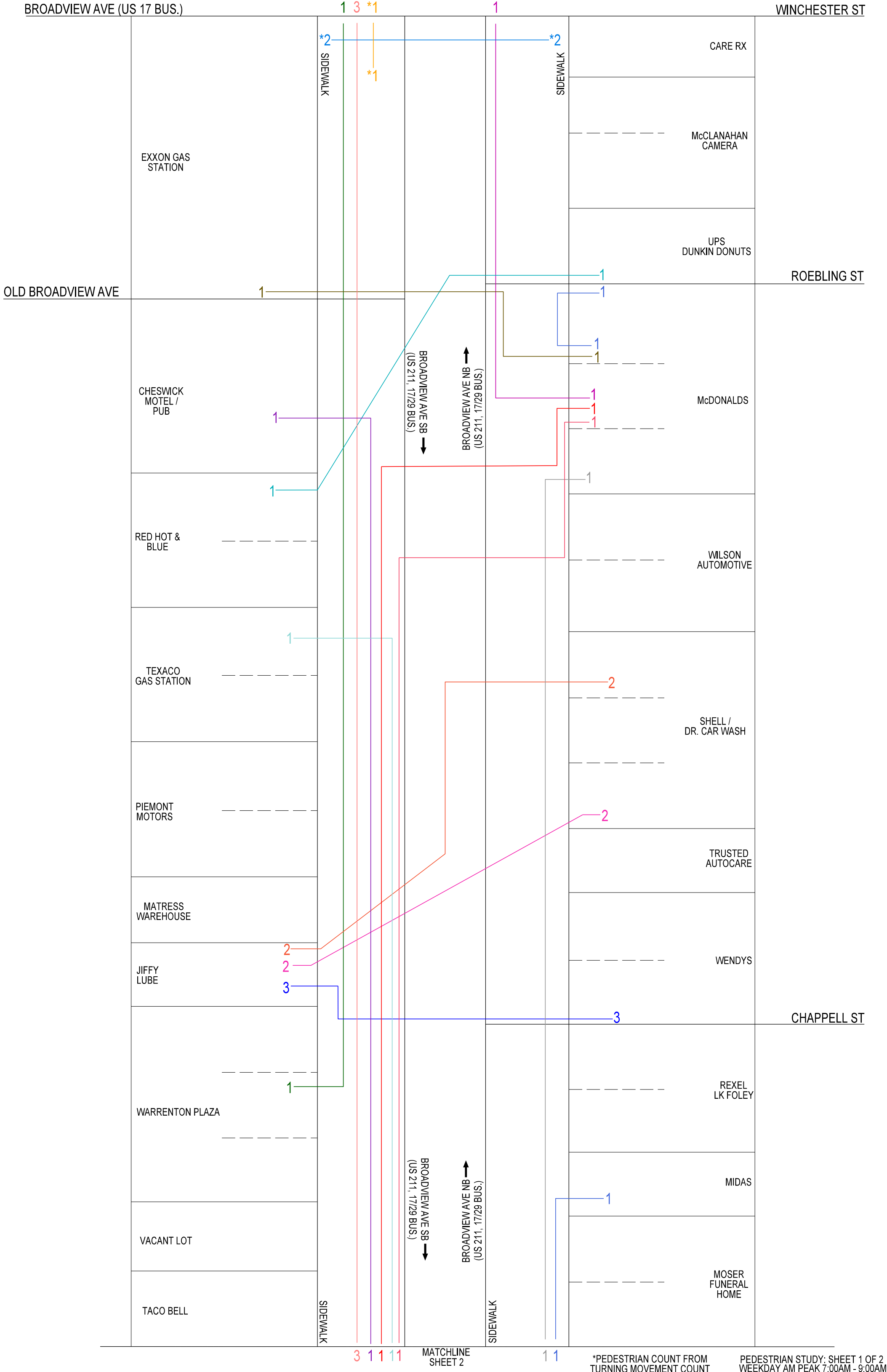
| REVISED                                                                                                                                         | STATE | PROJECT                                                                       |                                   | SHEET NO. |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------|-----------------------------------|-----------|
|                                                                                                                                                 |       | ROUTE                                                                         | PROJECT                           |           |
|                                                                                                                                                 | VA.   | 17/29<br>BUS/211                                                              | 707-156-103, P.O.I.<br>R210, C501 |           |
| DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT |       |                                                                               |                                   |           |
| VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE)                                                                   |       | VDOT (Division) or Co. Name<br>(Location), Virginia<br>(TECHNICAL DISCIPLINE) |                                   |           |

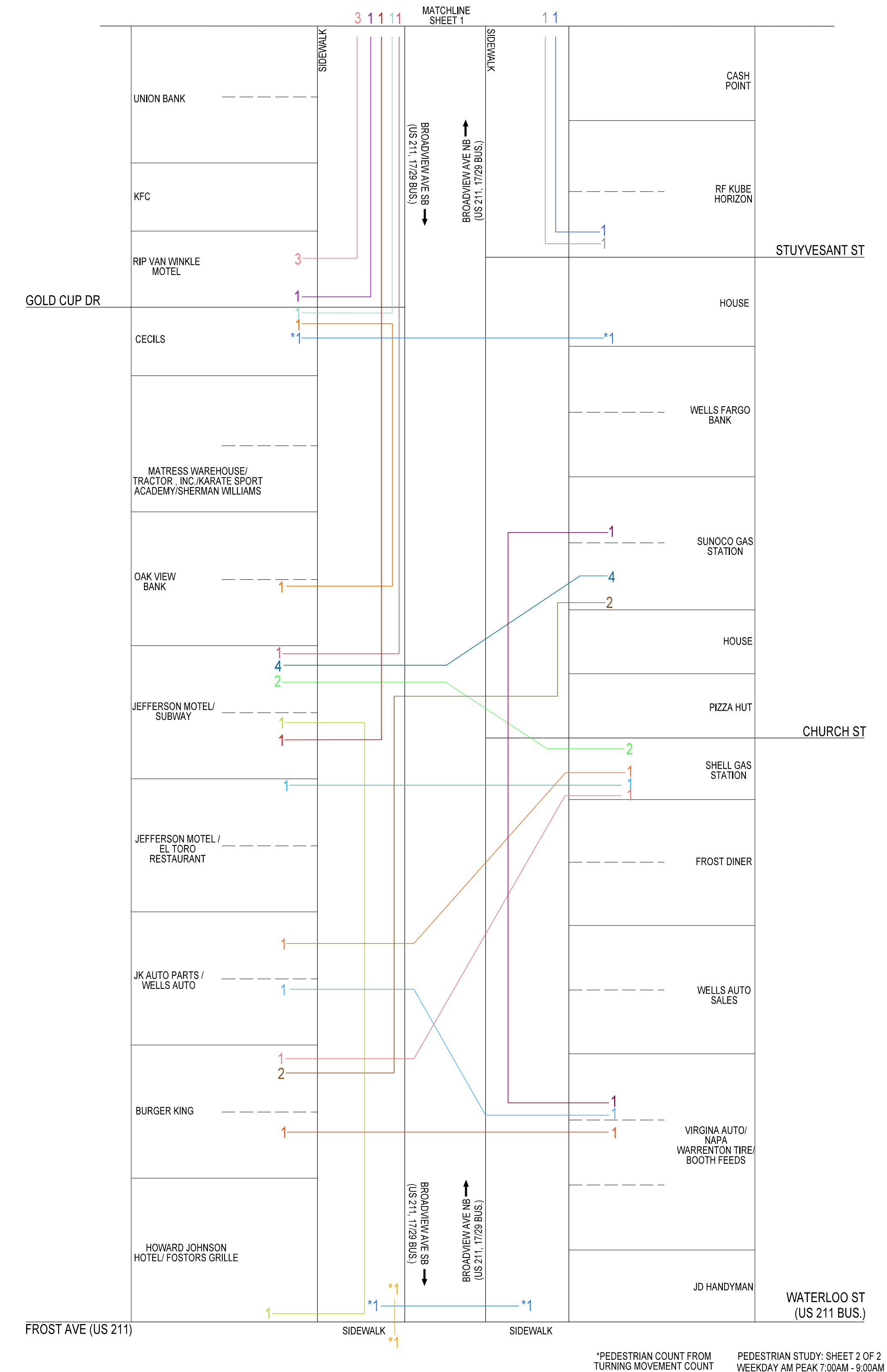


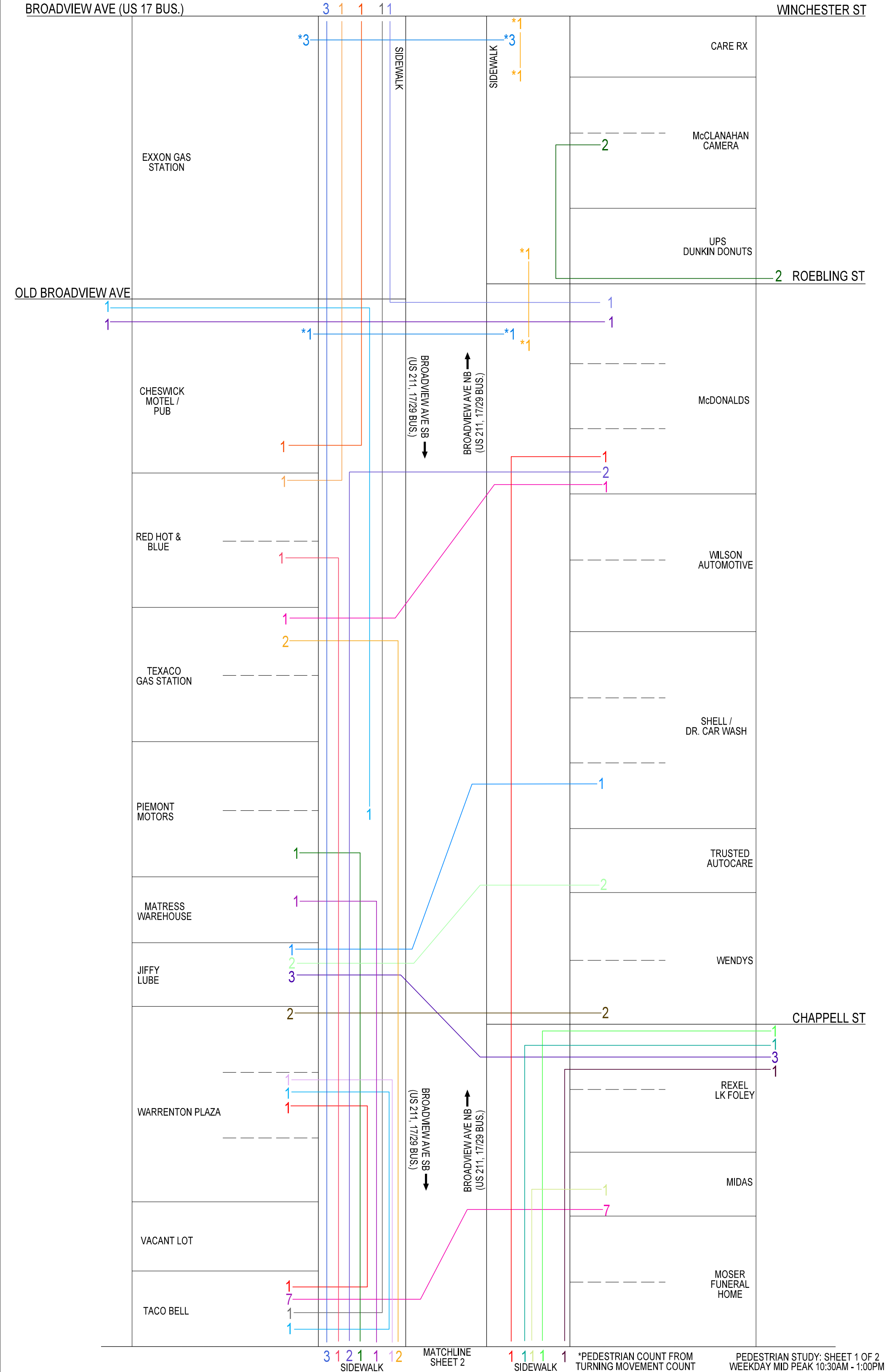
## **APPENDIX N**

### **Traffic Studies – Pedestrian Flow Diagrams**

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BROADVIEW AVE (US 17 BUS.)

WINCHESTER ST

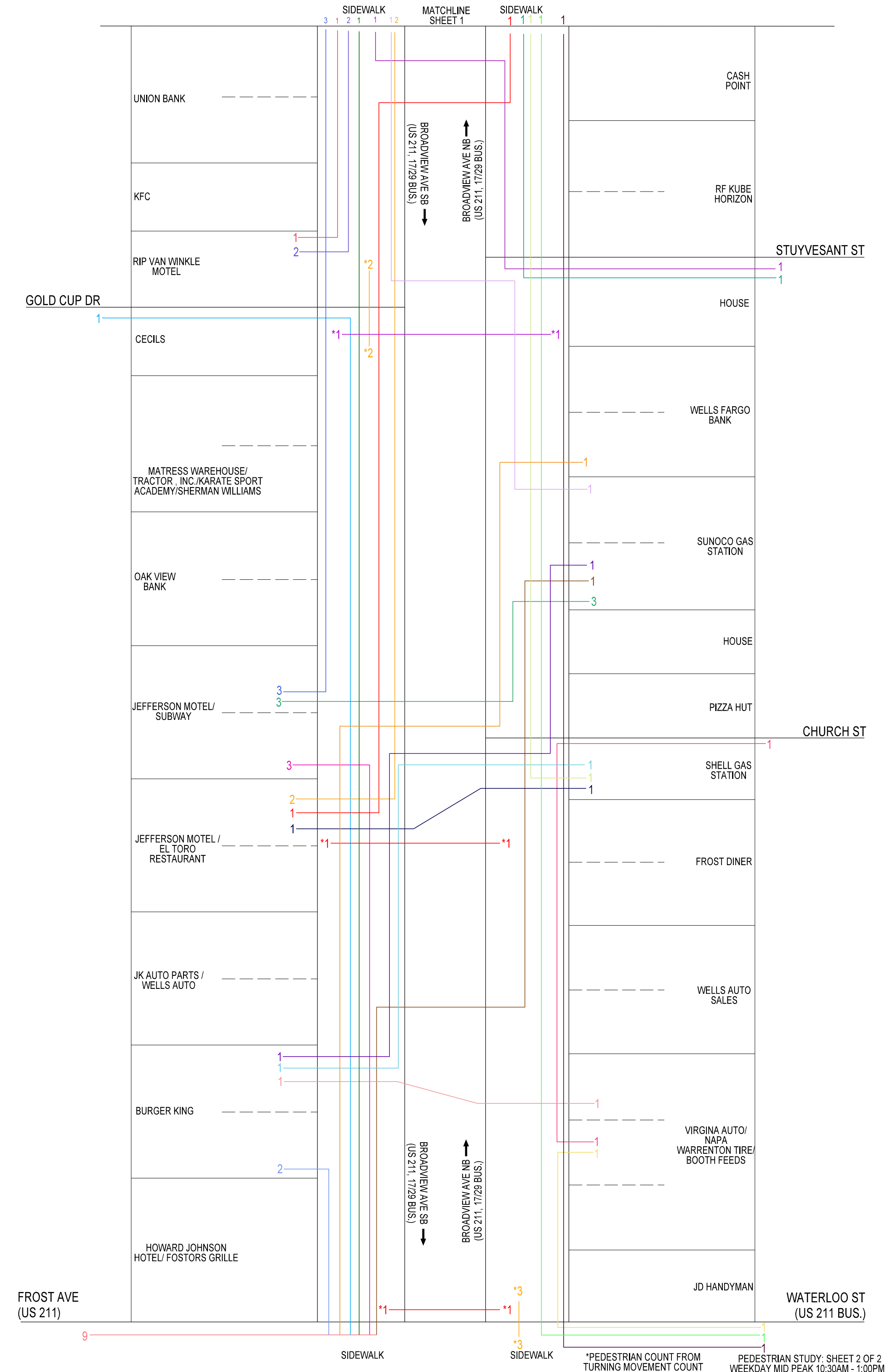
OLD BROADVIEW AVE

ROEBLING ST

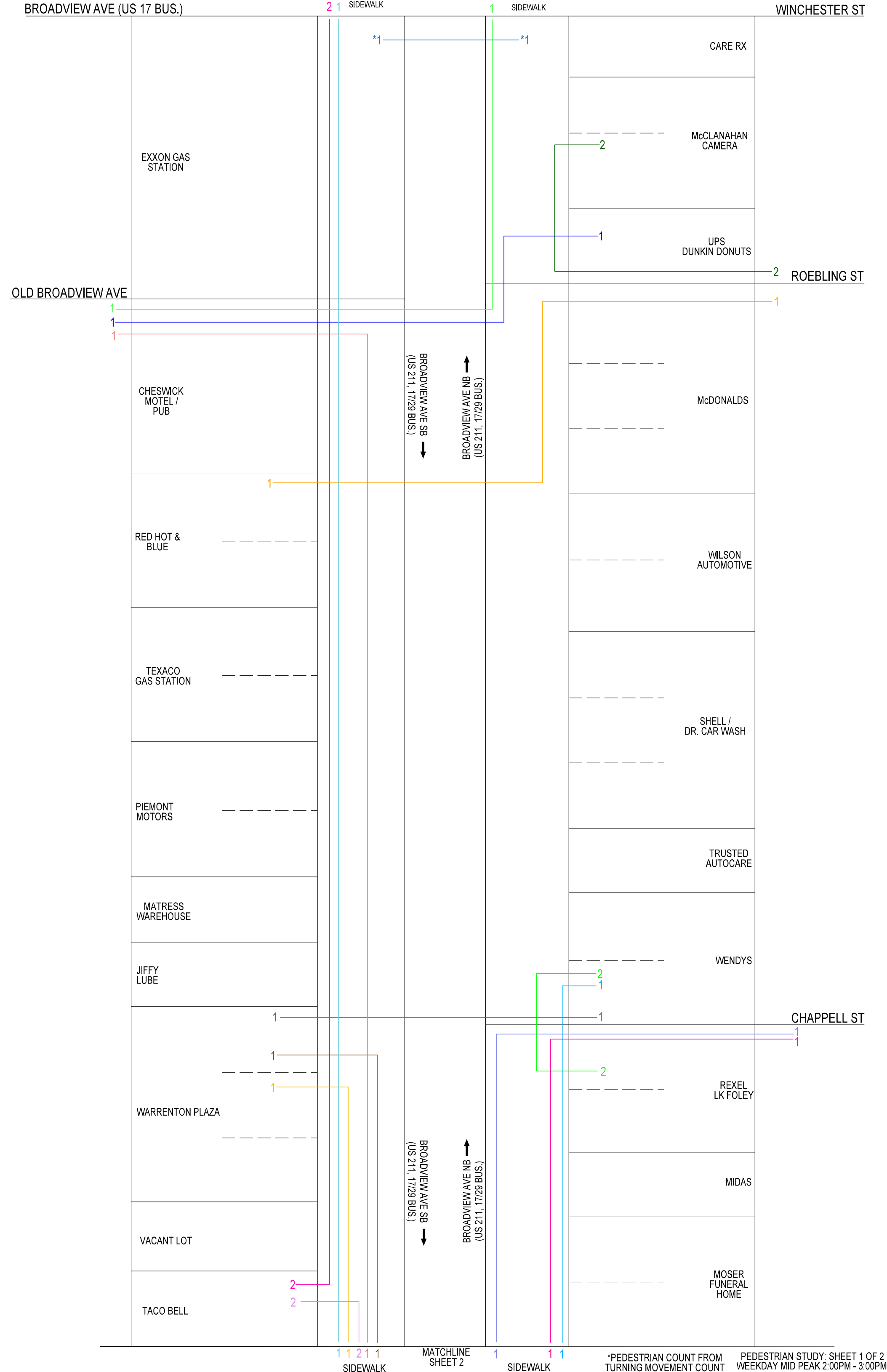
MATCHLINE  
SHEET 2

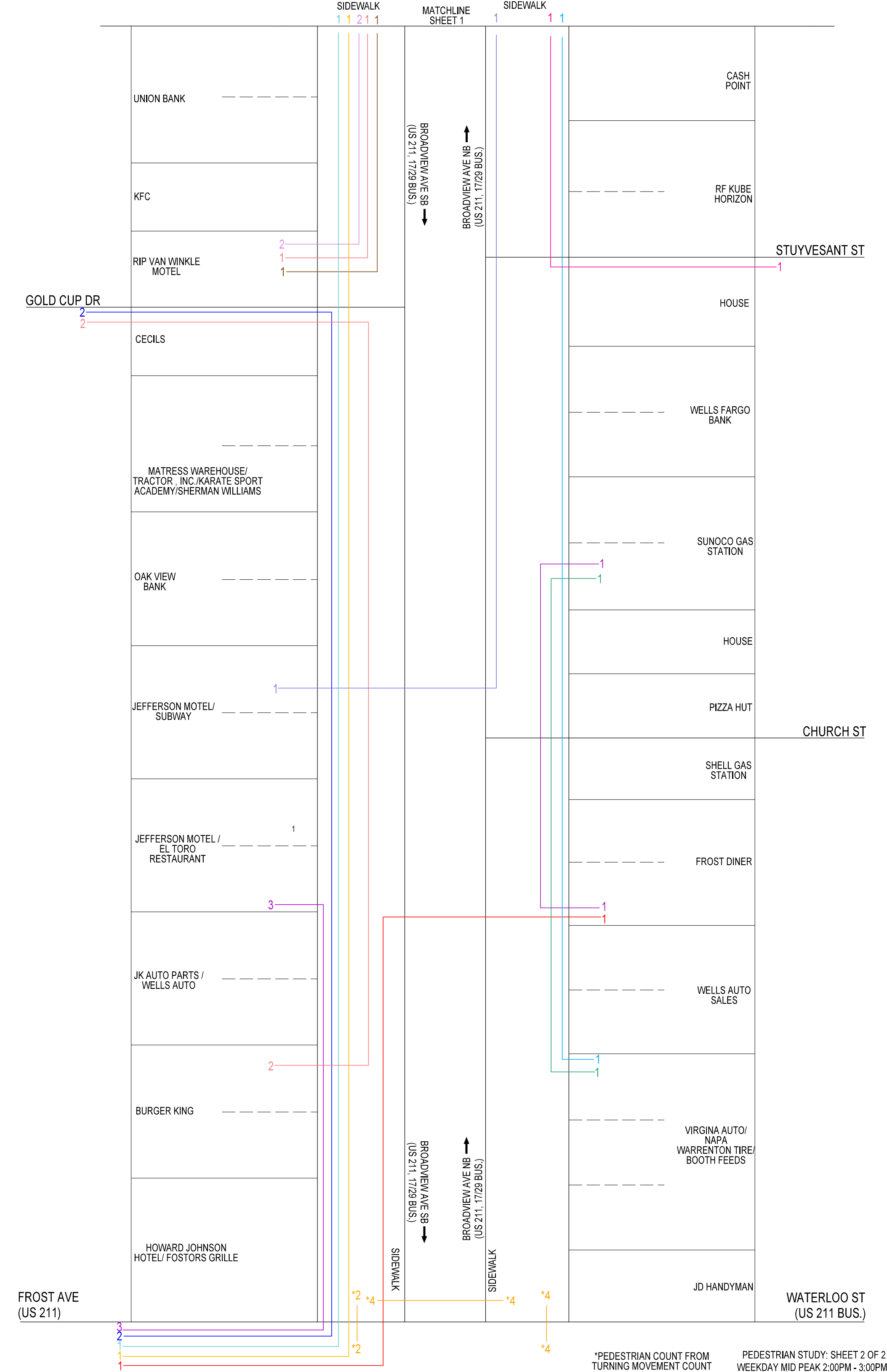
\*PEDESTRIAN COUNT FROM  
TURNING MOVEMENT COUNT

PEDESTRIAN STUDY: SHEET 1 OF 2  
WEEKDAY MID PEAK 10:30AM - 1:00PM

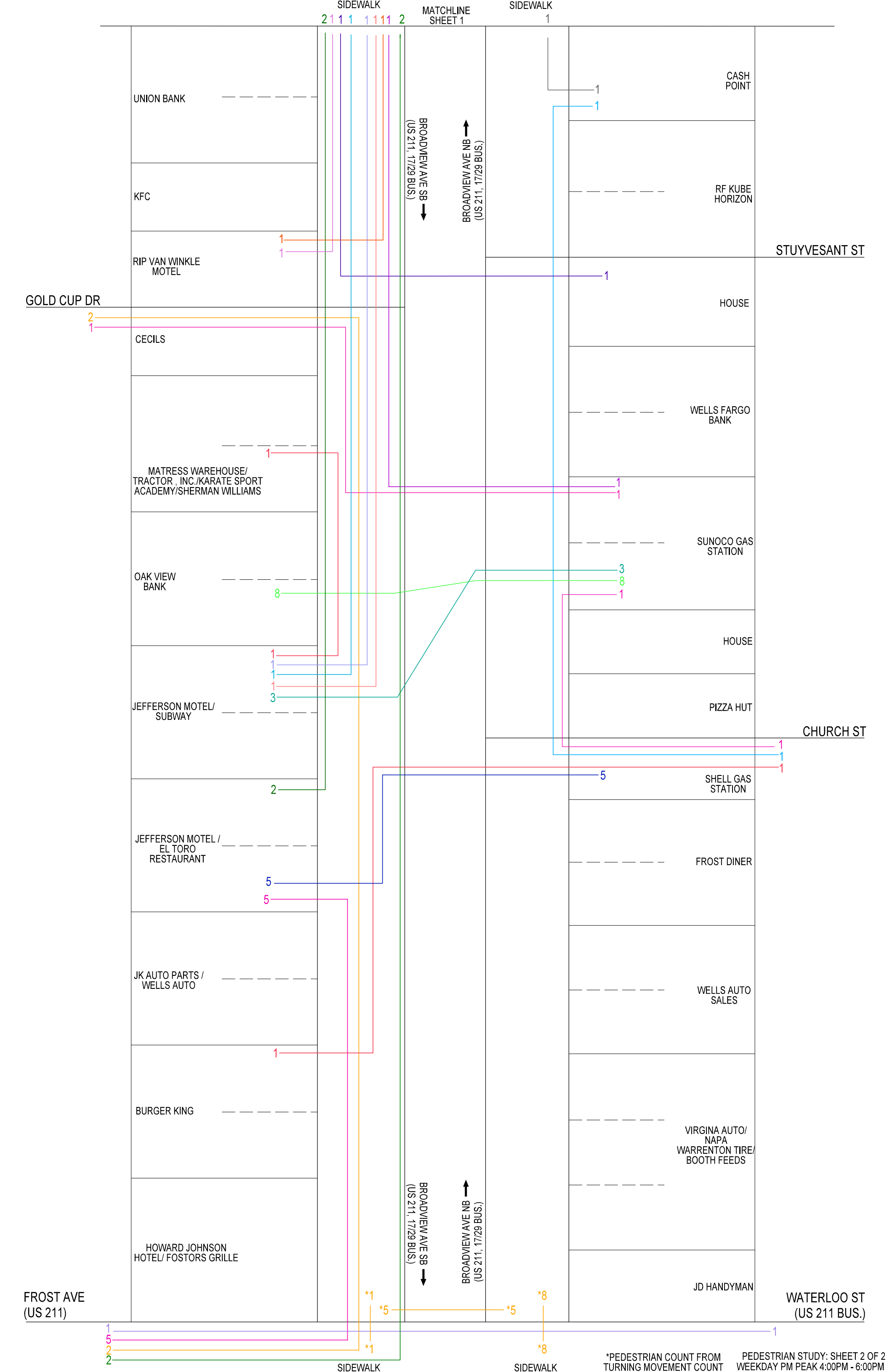


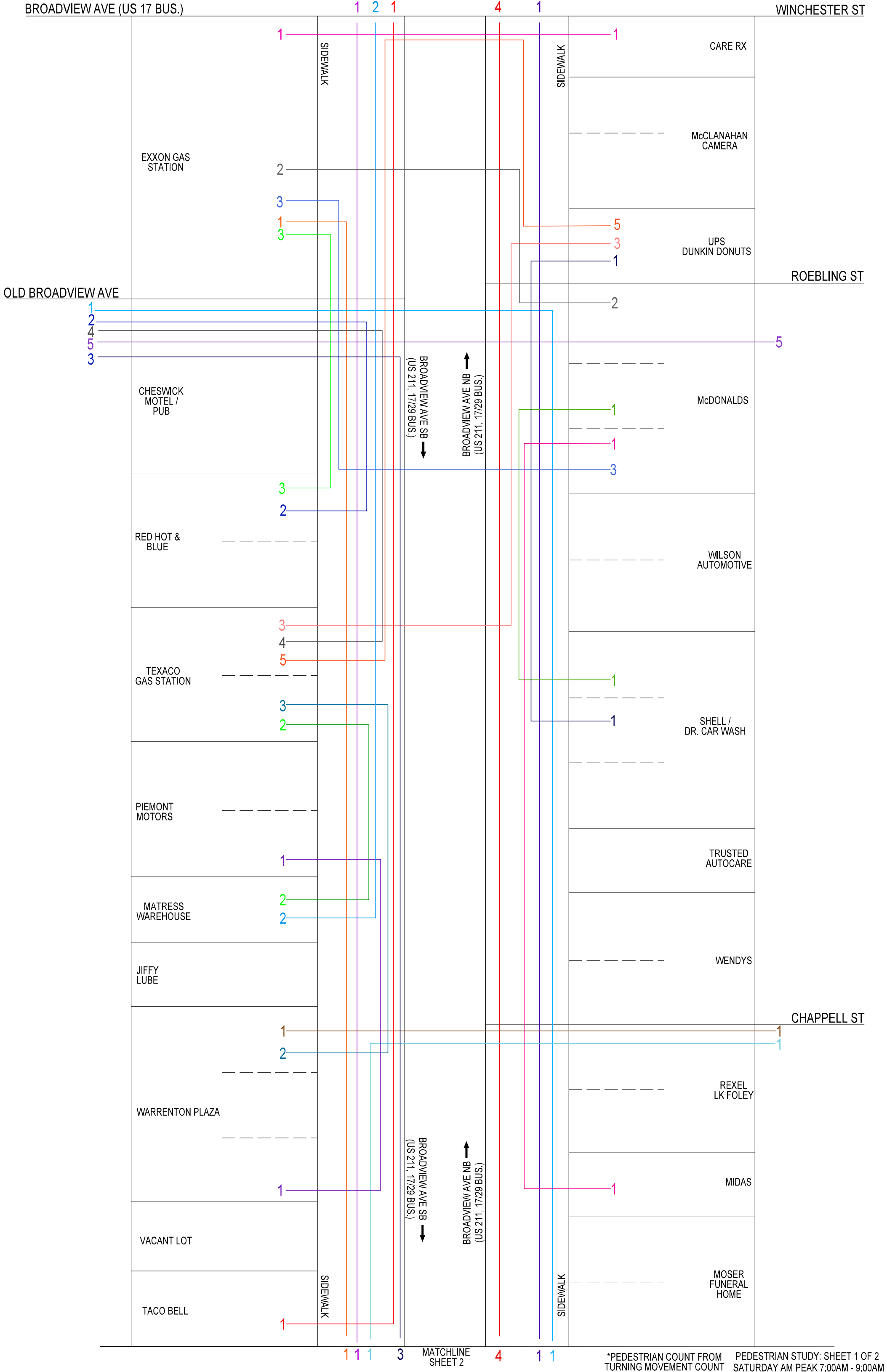






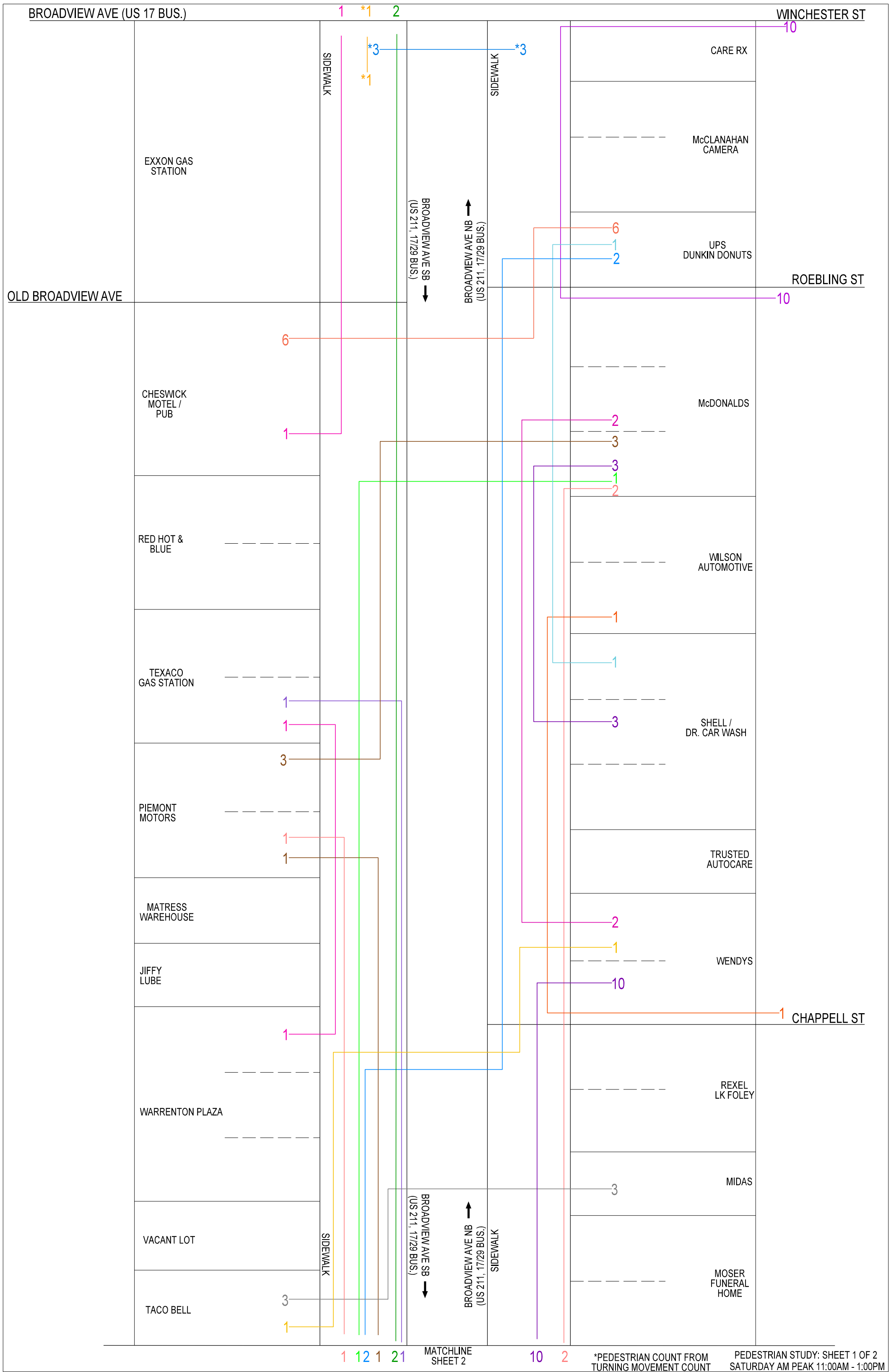


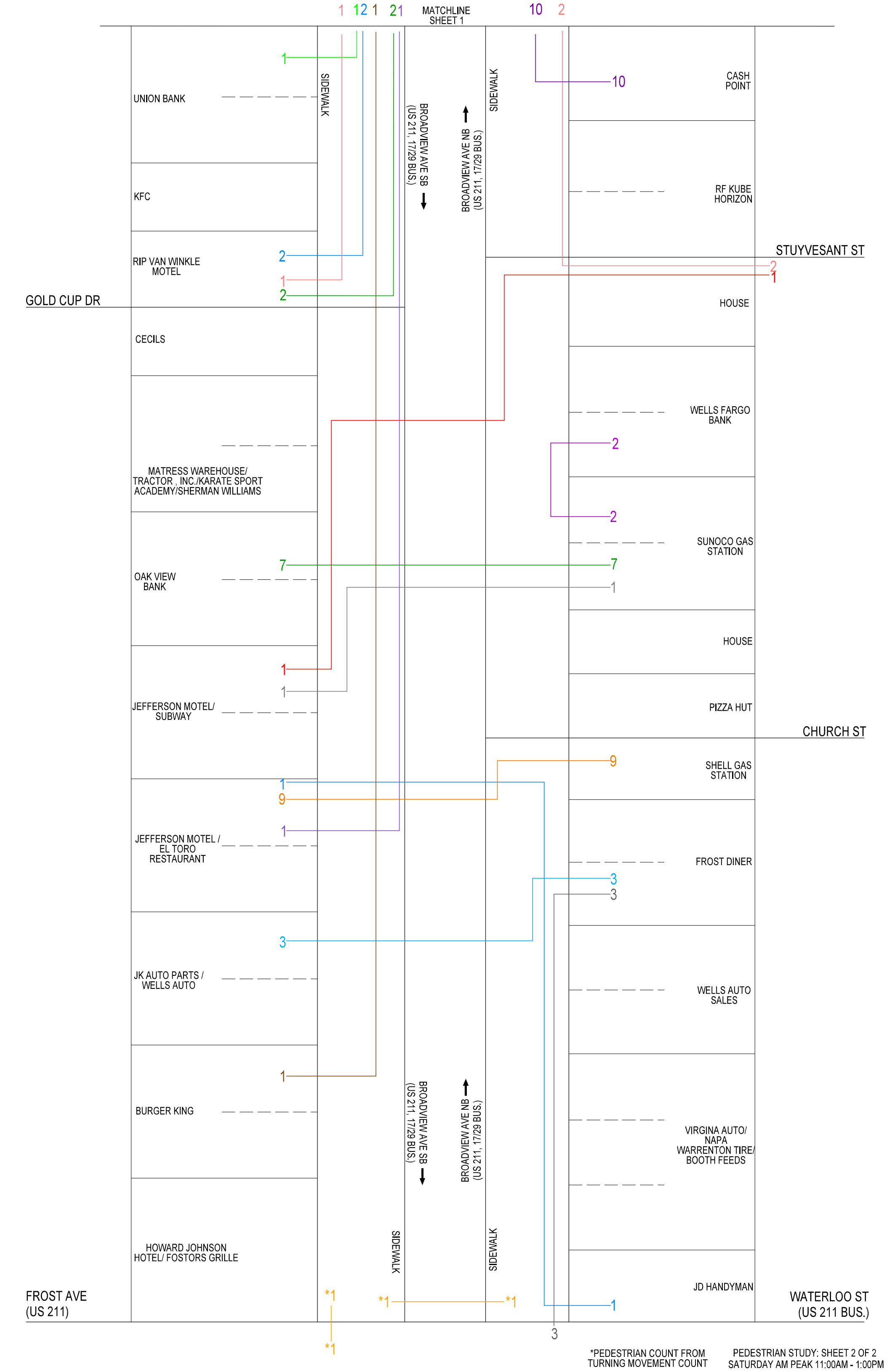




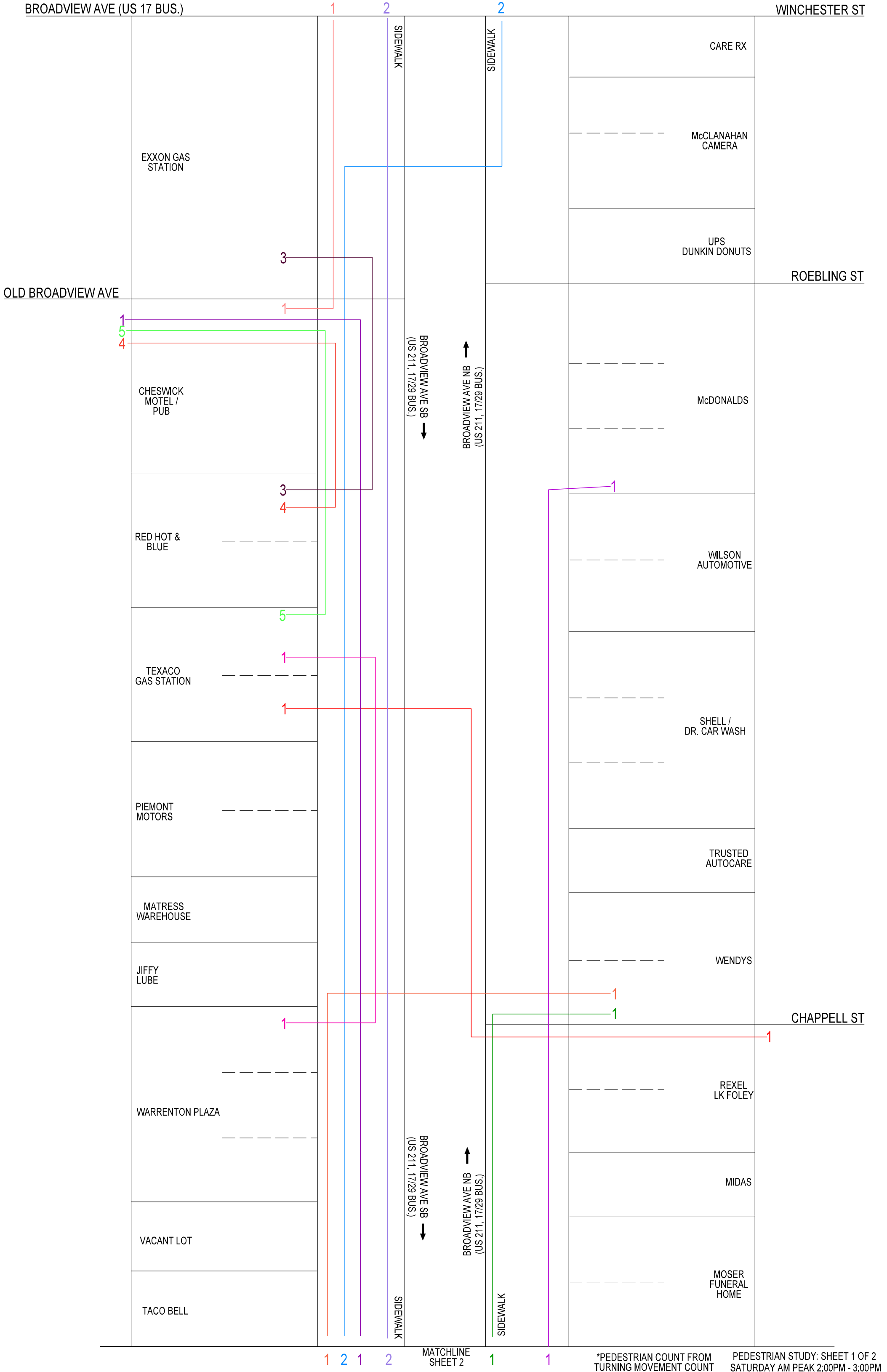


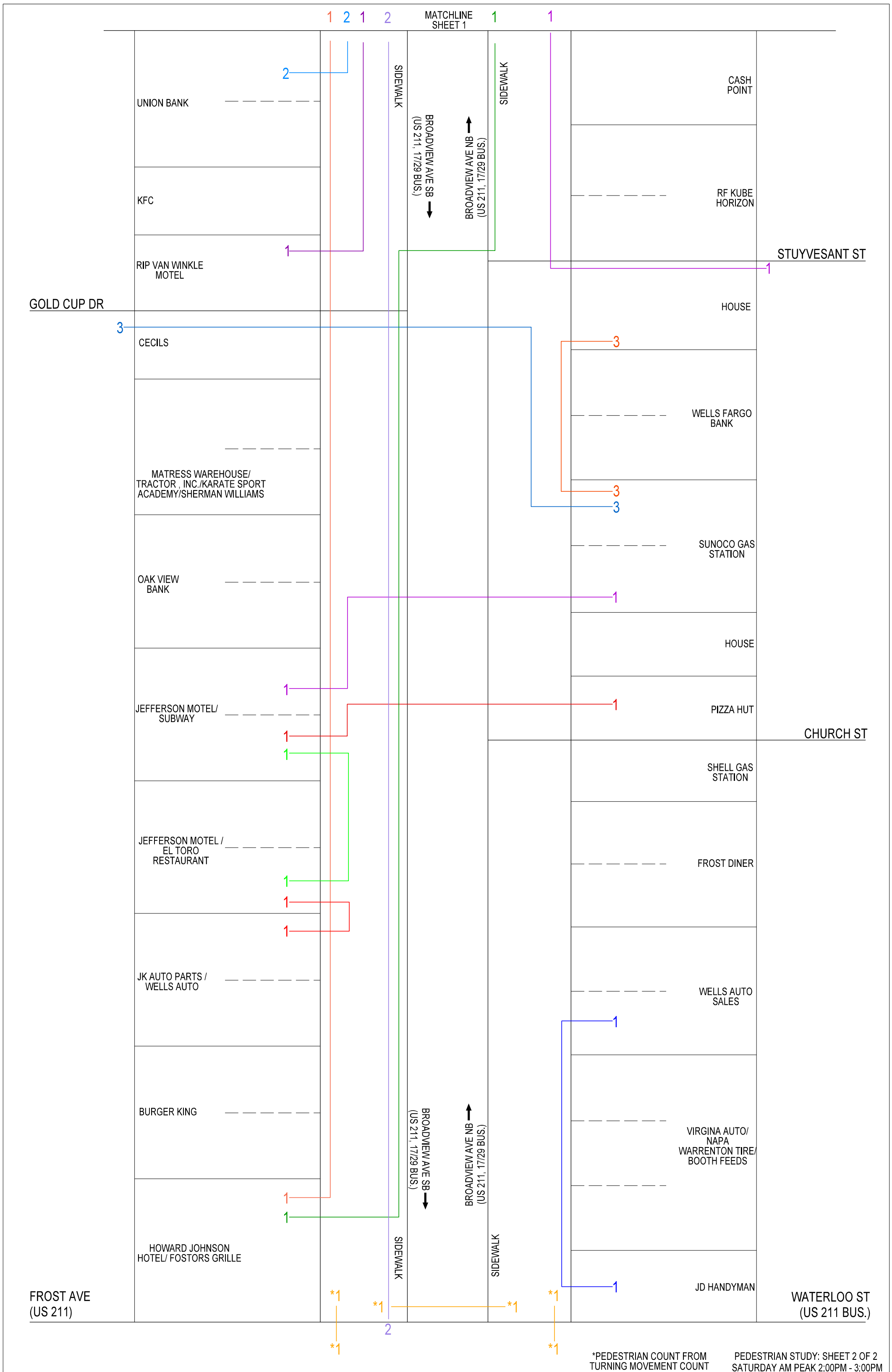


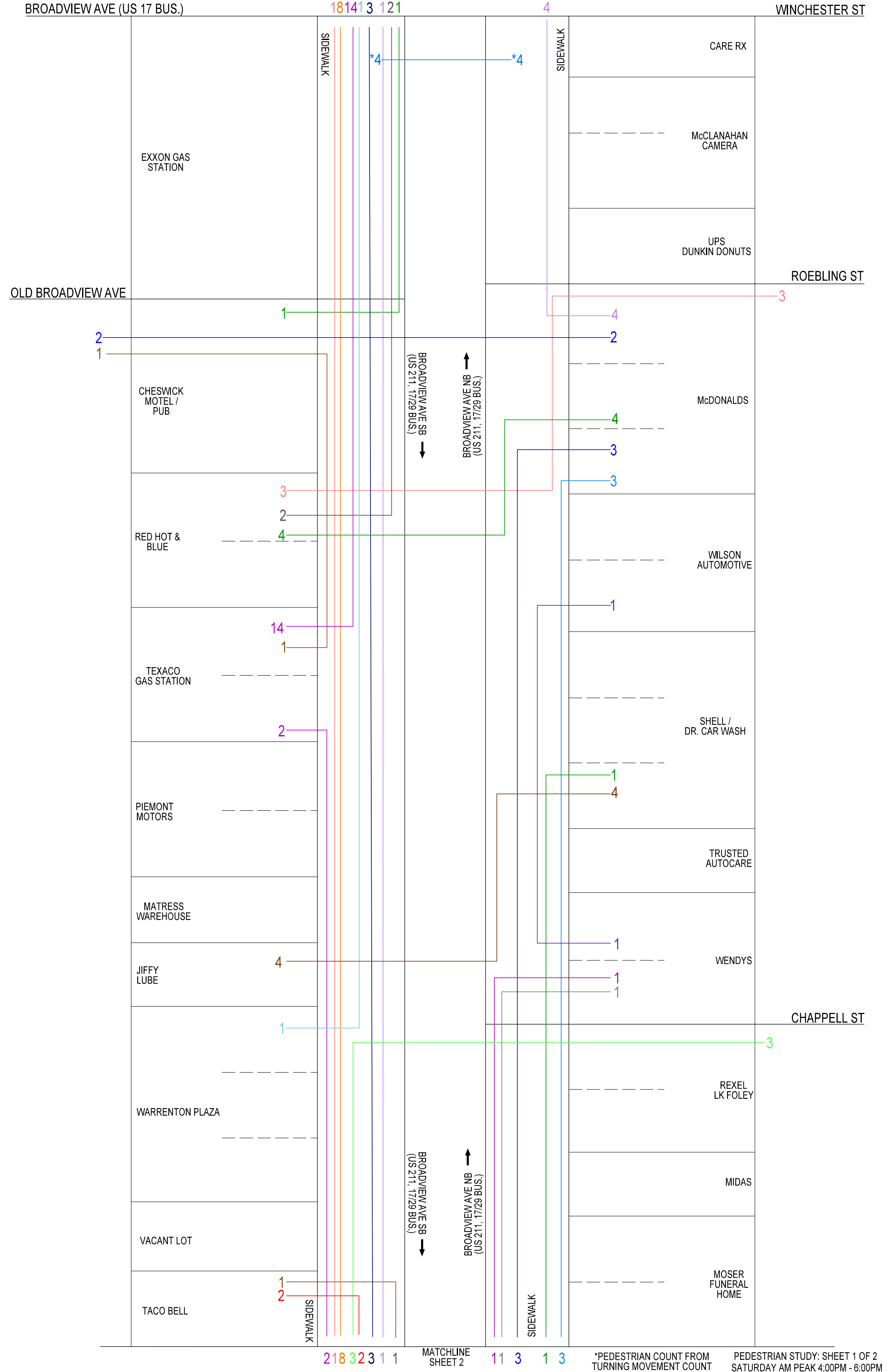


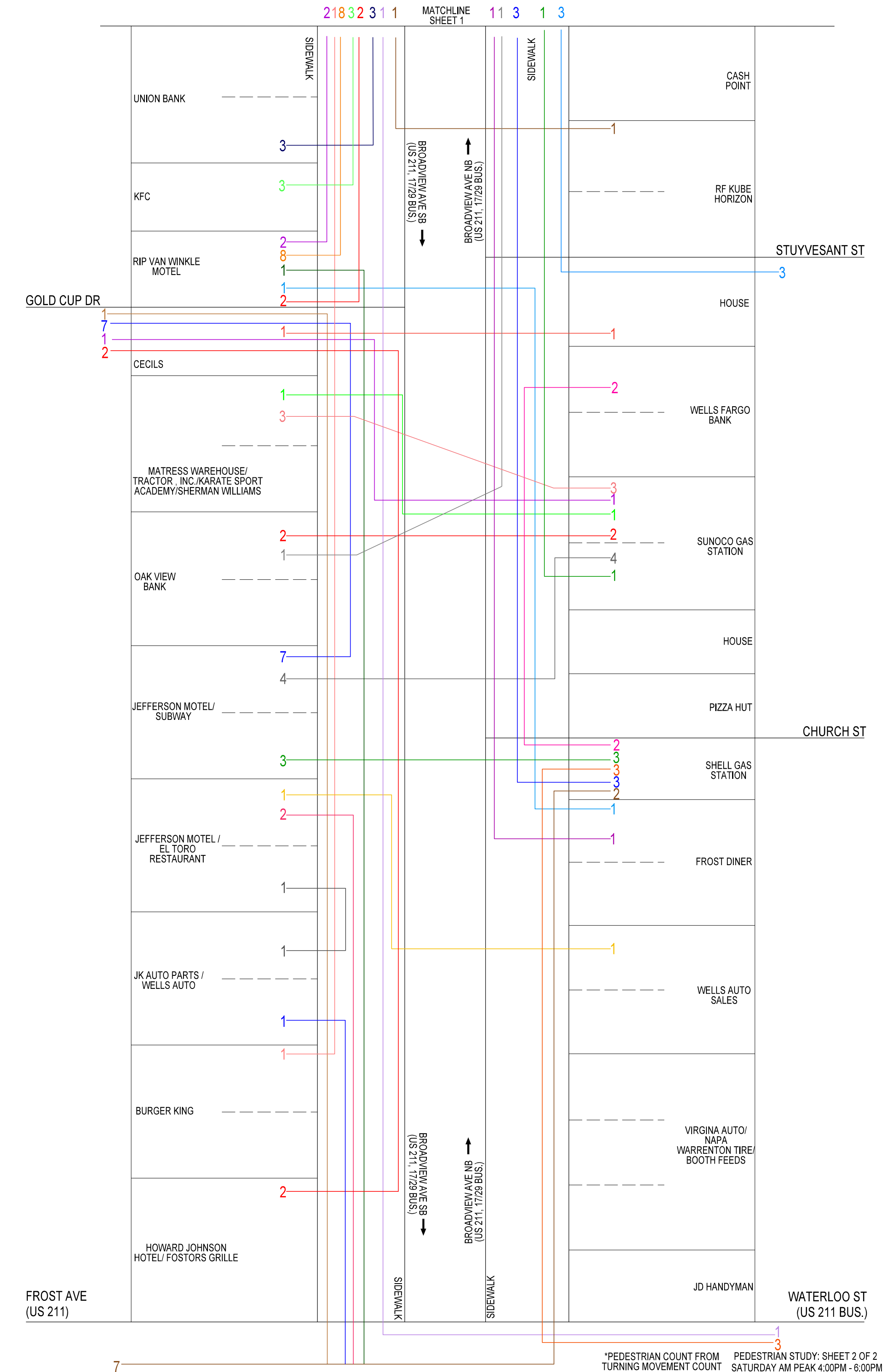












## **APPENDIX O**

### **Traffic Studies – Pedestrian Crossing Guidelines**

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## Special Treatments

There are a number of innovative treatments for pedestrians at controlled intersections, mostly related to pedestrian signals. At locations with a high number of pedestrian-vehicle conflicts, the following measures are means to enhance the safety of pedestrian crossings.

- At locations where there are high numbers of turning vehicles, special treatments that may be considered include<sup>6</sup>:
  - installing animated eye light emitting diode (LED) signals
  - equipping signals with early release or pedestrian lead time
  - installing special pavement stencils onto the pavement such as “Pedestrians Look Left” and “Watch for Turning Vehicles”
  - designing or retrofitting intersections with reduced corner radii.
- At locations where there are high numbers of pedestrians around or near an intersection, special treatments that may be considered include<sup>6</sup>:
  - equipping signals with pedestrian “scramble” phases
  - implementing “No Right Turn on Red” restrictions
  - installing STOP lines or YIELD lines in advance of crosswalks.
- At locations where there are wide intersections, special treatments that may be considered include<sup>6</sup>:
  - installing additional pedestrian signal heads in a median (if possible), if the width of the crossing is greater than 60 feet
  - installing countdown signals
  - installing pedestrian refuge islands and medians
  - installing bulbouts or curb extensions.

## GUIDELINES FOR MARKING CROSSWALKS AT UNCONTROLLED LOCATIONS

This section describes guidance for the installation of marked crosswalks at uncontrolled approaches of intersections and mid-block locations. Crosswalk lines should not be used indiscriminately. An engineering study should be performed before crosswalk markings are installed at uncontrolled locations.

Pedestrian crossing warning signs should always be installed in advance of mid-block crossings. Placement of advance warning signs depends on the speed of motor vehicle traffic and other conditions, such as available sight distance. If yield lines are used in advance of a mid-block crosswalk, “Yield Here to Pedestrians” signs shall be placed 20 to 50 feet in advance of the crosswalk.<sup>1</sup> Refer to Sections 3B.17 and 2B.11 of the MUTCD for further guidance.<sup>1</sup> In-street pedestrian crossing signs can also be used at crosswalk locations to remind road users of laws

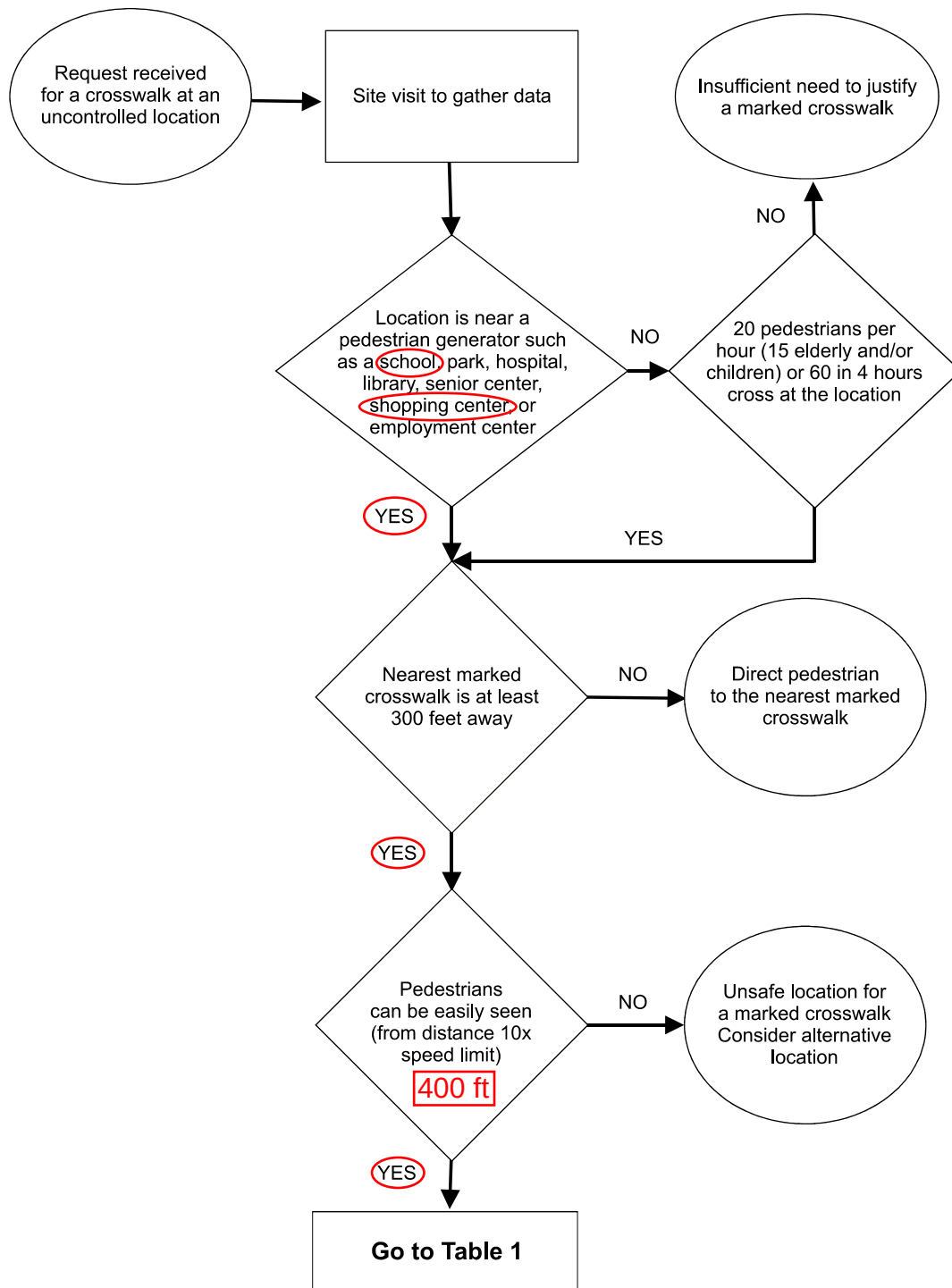
regarding right of way at an unsignalized pedestrian crossing.<sup>1</sup> Refer to Section 2B.12 of the MUTCD for further guidance on in-street pedestrian crossing signs.<sup>1</sup>

### **Basic Justification for Marking a Crosswalk**

Crossings should be marked where *all* of the following are the case<sup>6</sup>:

- Sufficient demand exists to justify the installation of a crosswalk. Uncontrolled crossings should be identified as a candidate for marking if there is a demonstrated need for a marked crosswalk. Need can be demonstrated by either of the following:
  - The crosswalk would serve 20 pedestrians per hour during the peak hour, 15 elderly and/or children per hour, or 60 pedestrians total for the highest consecutive 4-hour period; or
  - The crossing is on a direct route to or from a pedestrian generator, such as a school (refer to section 7C.03 of the MUTCD)<sup>1</sup>, library, hospital, senior center, shopping center, park, employment center, and transit center or service.
- The location is 300 feet or more from another crossing location or a controlled crossing location.
- The location has sufficient sight distance (sight distance in feet should be greater than 10 times the speed limit) and/or sight distance will be improved prior to crosswalk marking.
- Safety considerations do not preclude a crosswalk.

Figure 3 and Table 1 should be used to determine if special treatments are needed to ensure safe crossing at uncontrolled locations.



**Figure 3. Flowchart for Justifying Installation of Marked Crosswalks at Uncontrolled Intersections.** Adapted from City of Stockton Public Works Department, *Pedestrian Safety and Crosswalk Installation Guidelines*. Stockton, California, 2003.



**Table 1. Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements at Uncontrolled Locations<sup>a</sup>**

|                                         | ≤ 9,000 ADT |        |         | > 9,000 ADT to ≤ 12,000 ADT |        |         | > 12,000 ADT to ≤ 15,000 ADT |        |         | > 15,000 ADT |        |                      |
|-----------------------------------------|-------------|--------|---------|-----------------------------|--------|---------|------------------------------|--------|---------|--------------|--------|----------------------|
|                                         | ≤30 mph     | 35 mph | ≥40 mph | ≤30 mph                     | 35 mph | ≥40 mph | ≤30 mph                      | 35 mph | ≥40 mph | ≤30 mph      | 35 mph | ≥40 mph <sup>b</sup> |
| 2 lanes                                 |             |        |         |                             |        |         |                              |        |         |              |        |                      |
| 3 lanes                                 |             |        |         |                             |        |         |                              |        |         |              |        |                      |
| + + 4 lanes, raised median <sup>c</sup> |             |        |         |                             |        |         |                              |        |         |              |        |                      |
| + + 4 lanes, no median                  |             |        |         |                             |        |         |                              |        |         |              |        |                      |

 **Candidate sites for marked crosswalks.** Marked crosswalks must be installed carefully and selectively. First, an engineering study is needed to determine whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, but a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc., may be needed at other sites. If the speed limit is less than or equal to 30 mph, use **Level 1** or **Level 2** devices. If the speed limit exceeds 30 mph, use **Level 2** devices. *Refer to Level 1 and Level 2 devices in the Special Treatments section.*

 **Probable candidate sites for marked crosswalks.** Pedestrian crash risk may increase if marked crosswalks are added without other pedestrian facility enhancements. Add **Level 3** or **Level 4** devices if feasible. *Refer to Level 3 and Level 4 devices in the Special Treatments section.*

 **Marked crosswalks alone are insufficient, since pedestrian crash risk may increase if only marked crosswalks are provided.** Consider using **Level 5** devices if feasible. If not feasible, use multiple treatments from **Level 2**, **Level 3**, or **Level 4** devices. *Refer to Level 5 devices in the Special Treatments section.*

<sup>a</sup>These guidelines include intersection and mid-block locations with no traffic signal or stop sign on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor site distance, complex or confusing designs, substantial volumes of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will not make a crossing safer or necessarily result in more drivers stopping for pedestrians. Whenever marked crosswalks are installed, it is important to consider other pedestrian facility enhancements, as needed, to improve the safety of the crossing (for example, raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic calming measures, curb extensions). **These are general recommendations; an engineering study should be performed to determine where to install marked crosswalks.**

<sup>b</sup>Where the posted speed limit or 85<sup>th</sup> percentile speed exceeds 40 mph, marked crosswalks alone should not be used at uncontrolled intersections with an ADT greater than 15,000.

<sup>c</sup>The raised median or refuge island must be at least 4 feet (1.2 meters) wide and 6 feet (1.8 meters) long to adequately serve as a refuge area for pedestrians.

Adapted from Zegeer, C.V., Stewart, R.J., Huang, H.H., and Lagerwey, P.A. *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines*. FHWA-RD-01-075. Federal Highway Administration, Washington, D.C., 2002.

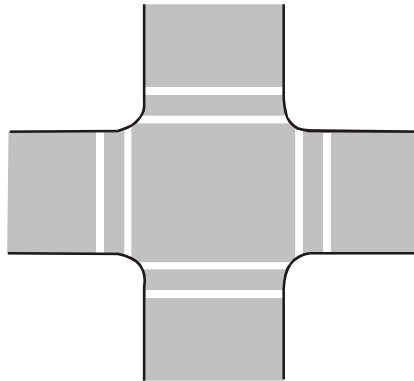
## Special Treatments

There are a number of innovative treatments for pedestrians at uncontrolled crossing locations. Level 1 devices are typically less costly to install and are found at locations with potentially lower levels of vehicle/pedestrian conflict. Level 2 through 5 devices can be more costly to install and are used at locations with an ascending order of potential vehicle/pedestrian conflicts.

### Level 1 Devices

#### *Standard Crosswalk*

Standard crosswalks (Figure 4) consist of two parallel lines and can be used at uncontrolled intersections. They are not to be used at mid-block crossings. Refer to section 3B.17 of the MUTCD for further guidance on standard crosswalks<sup>1</sup>.



**Figure 4. Standard Crosswalk**

#### *Raised Mid-Block Crosswalk*

Raised mid-block crossings (Figure 5) are sometimes constructed to provide a well-defined pedestrian crossing and to calm traffic. This type of crossing is suitable for only low-speed, low-volume local streets, since the raised crossing is essentially functioning as a speed table or hump.

Raised crossings enhance pedestrian safety by creating a vertical pavement undulation that forces motorists to slow down when approaching. They can function as an extension of the sidewalk and allow pedestrians to cross at a constant grade without the need for curb ramps or median cut-throughs. Raised crossings should have a 6-foot (1.8-meter) parabolic approach transition, raising the vehicle to 3 to 4 inches (7.6 to 10.2 centimeters) above the nominal pavement grade. The flat section of the crossing table should be 10 to 12 feet (3.0 to 3.7 meters) wide. Raised crossings need to be highly visible, either striped as a mid-block crossing or constructed of a contrasting pavement design. Raised crossings should be signed with advance warning signs and pedestrian crossing signs in the same manner as other mid-block crossings.<sup>12</sup>



**Figure 5. Raised Mid-block Crossing.** From <http://pedbikeimages.org/> / Portland Office of Transportation. Reprinted with permission.

### *Rumble Strips*

Rumble strips are series of intermittent, narrow, transverse areas of a rough-textured, slightly raised, or depressed road surface that are installed to alert road users to unusual traffic conditions.<sup>1</sup> They can be used as a temporary traffic control device in areas of temporary, unexpected crosswalks. Rumble strips should be placed in advance of a crosswalk. Because of maintenance issues, rumble strips should be used only in special circumstances.

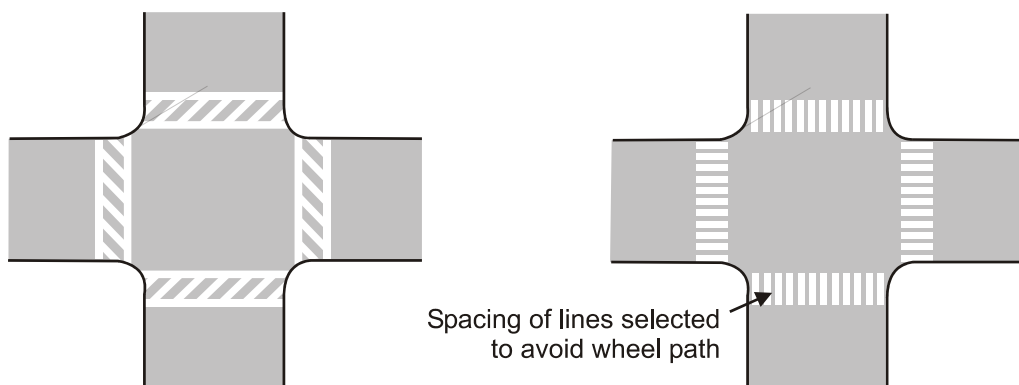
### **Level 2 Devices<sup>6</sup>**

#### *High-Visibility Crosswalks*

High-visibility crosswalks should be white and retroreflective (visible at night). They include the textured pavement crosswalks (Figure 6), “zebra” and “continental” crosswalks (Figure 7), and “triple-four” crosswalks (Figure 8). Textured pavement crosswalks are composed of stamped concrete or asphalt or brick pavers placed in a pattern and are outlined with white, retroreflective markings. These types of crosswalks can increase driver awareness of pedestrian activity by improving visibility and creating a different audible tone. The treatment can also improve the aesthetics of crosswalk installations. Disadvantages include higher construction and maintenance costs and the lack of smooth, accessible surfaces for pedestrians.<sup>13</sup>



**Figure 6. Example of a Textured Pavement Crosswalk.** From [www.pedbikeimages.org](http://www.pedbikeimages.org) / Dan Burden. Reprinted with permission.



**Figure 7. “Zebra” Crosswalk (Left) and “Continental” Crosswalk (Right).**

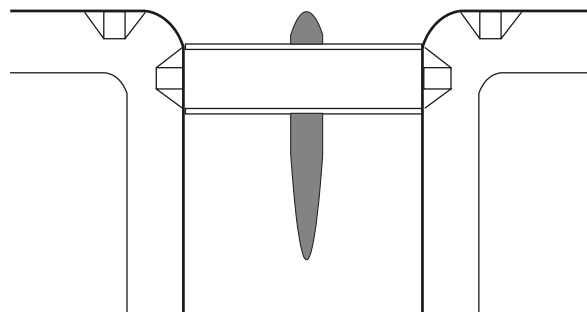


**Figure 8. “Triple-Four” Crosswalk.** From [www.pedbikeimages.org/](http://www.pedbikeimages.org/) Dan Burden. Reprinted with permission.

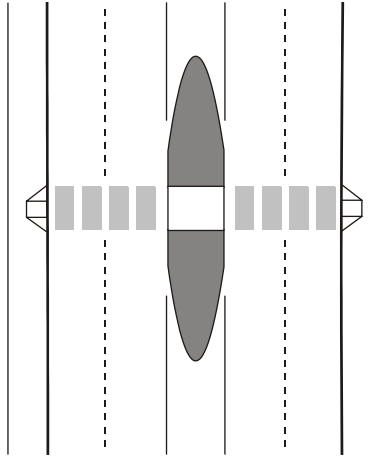
## Level 3 Devices<sup>6</sup>

### *Refuge Islands*

Refuge islands (Figures 9 and 10) allow pedestrians to cross one segment of the street to a relatively safe location out of the travel lanes and then continue across the next segment in a separate gap. At unsignalized crosswalks on a two-way street, a median refuge island allows the crossing pedestrian to tackle each direction of traffic separately. This can significantly reduce the time a pedestrian must wait for an adequate gap in the traffic stream.<sup>11</sup> A pedestrian pushbutton should be placed in the median of signalized mid-block crossings where the crossing distance exceeds 60 feet (18.2 meters). Curb ramps or cut-throughs should be provided for accessibility.<sup>14</sup> Refer to VDOT’s *Guidelines for the Placement of Curb Ramps for Accessible Routes and Continuous Passages* on when and how to use curb ramps.<sup>15</sup>



**Figure 9. Typical Median Refuge Island at an Intersection, with Median Nose and At-Grade Passage for a Crosswalk.**



**Figure 10. Typical Median Refuge Island at Mid-Block, with At-Grade Passage for Crosswalk.**

### *Split Pedestrian Crossover (SPXO)*

The SPXO (Figure 11) is a pedestrian refuge that channels pedestrians to cross one half of the street; enter the island at one end; walk toward the flow of traffic; and exit at the other end to cross the second half of the street. This special treatment is primarily used at mid-block locations and is especially beneficial at or near transit connections.

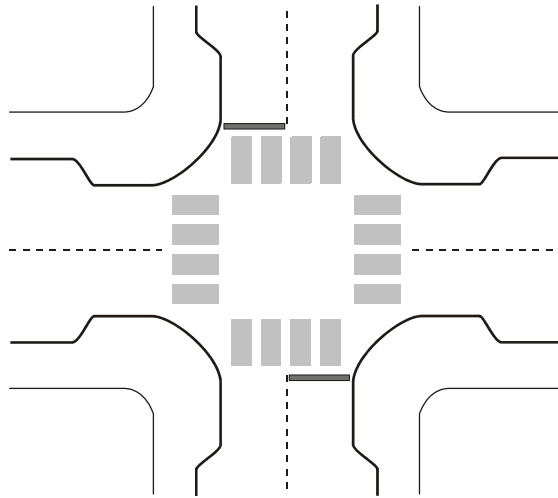


**Figure 11. Example of a Split Pedestrian Crossover.** From [www.pedbikeimages.org/](http://www.pedbikeimages.org/) Dan Burden. Reprinted with permission.

## *Bulbouts*

### **Intersections**

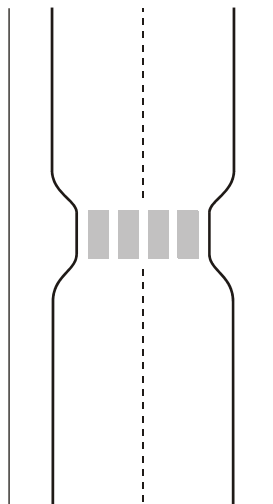
At an intersection, each corner of the bulbout (Figure 12) is extended into the intersection by approximately 7 to 8 feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.



**Figure 12. Bulbouts at an Intersection.**

### **Mid-Block Locations**

At mid-block locations, bulbouts (Figure 13) are extended into the street by approximately 7 to 8 feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.



**Figure 13. Bulbouts at a Mid-Block Location.**



## Level 4 Devices<sup>6</sup>

### *Overhead Signs and Flashing Beacons*

Overhead signs can be various signs showing the universal pedestrian symbol, including standard yellow, fluorescent yellow, and LED displays that hang from a mast arm and extend over the street. Flashing beacons should accompany the overhead signs (Figure 14). A flashing beacon provides a relatively low-cost treatment for mid-block pedestrian crossings. The flashing light alerts drivers in advance of potential pedestrians without forcing them to stop unless there is actually a pedestrian in the crosswalk. This sort of device can be used on roadways with higher vehicular volumes without causing undue delay to drivers. Flashing beacons are most effective if they are operating only during times when there is a clear need to alert motorists, such as when pedestrians are actually present (rather than constantly flashing).<sup>3</sup> This can be done by using pedestrian pushbuttons (Figure 15) or passive activation. Refer to Section 4K.03 in the MUTCD for further guidance on flashing beacons.<sup>1</sup>



**Figure 14. Overhead Sign with Flashing Beacons.** From [www.pedbikeimages.org/](http://www.pedbikeimages.org/) ITE Pedestrian Bicycle Council. Reprinted with permission.



**Figure 15. Pedestrian Pushbutton for Flashing Beacon Operation.** From [www.pedbikeimages.org/](http://www.pedbikeimages.org/) Dan Burden. Reprinted with permission.



### *In-Roadway Warning Lights (IRWLs)*

IRWLs (Figure 16) should be installed with a flashing sign at the crosswalk and an advanced flashing sign ahead of the crosswalk. They should also be installed with advance audible warning devices for motorists, such as rumble strips. Refer to VDOT's *Guidelines for the Installation of In-Roadway Warning Lights* for further guidance.<sup>16</sup>



**Figure 16. In-Roadway Warning Lights at a Mid-block Crosswalk.** From [www.pedbikeimages.org](http://www.pedbikeimages.org) / ITE Pedestrian Bicycle Council. Reprinted with permission.

### **Level 5 Devices<sup>6</sup>**

#### *Pedestrian-Actuated Signals*

Pedestrian-actuated signals (Figure 17) should be placed at mid-block locations where vehicle and pedestrian volumes warrant a signal. Refer to Section 4C.05 Warrant 4, Pedestrian Volume of the MUTCD for further guidance on mid-block pedestrian-actuated signals.<sup>1</sup>



**Figure 17. Pedestrian-Actuated Mid-block Signal.** From [www.pedbikeimages.org](http://www.pedbikeimages.org) / ITE Pedestrian Bicycle Council. Reprinted with permission.