

Memorandum

TO: Town of Lysander Comprehensive Plan Update Committee

FROM: Meghan Vitale, SMTC

DATE: October 14, 2014

RE: Existing conditions assessment (Technical Memorandum #3)

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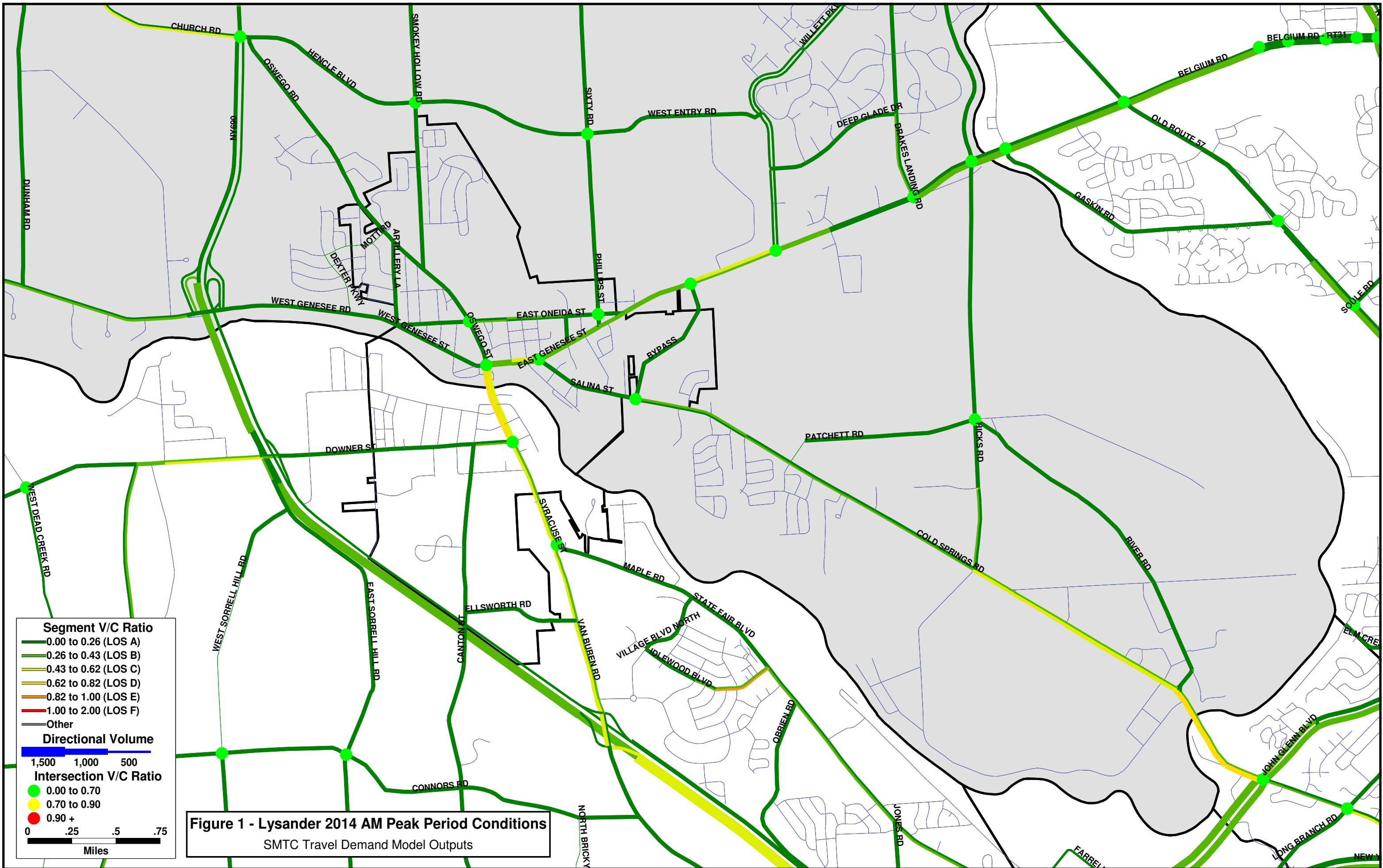
The SMTC has reviewed the outputs from our travel demand model for various intersections and segments within the Town of Lysander and conducted capacity analysis for selected intersections based on recent traffic count data. This memo summarizes the work conducted and our findings.

*Review of volume-to-capacity ratios from SMTC's travel demand model*

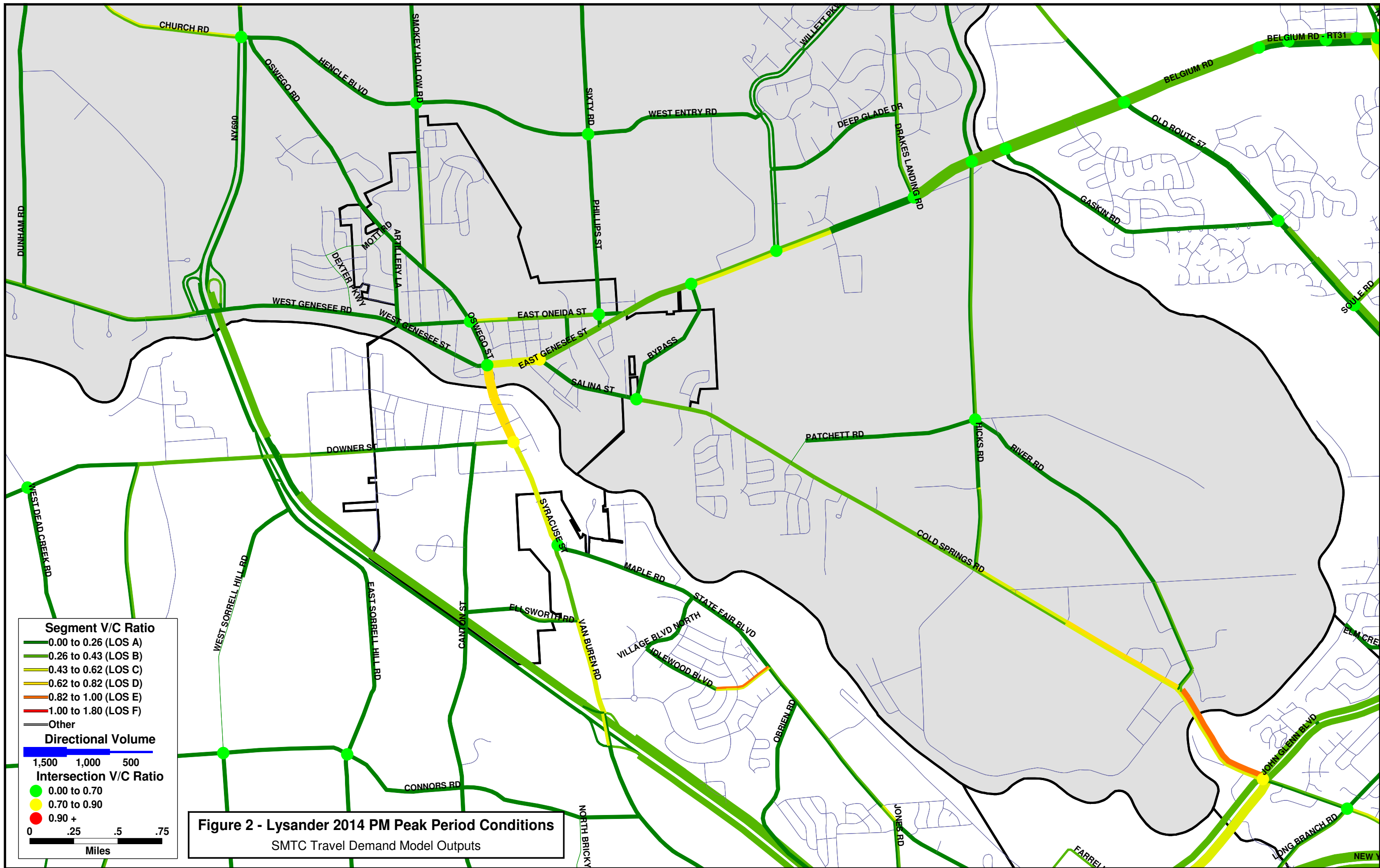
SMTC staff reviewed the volume-to-capacity ratios from the 2014 Existing Conditions travel demand model for road segments and intersections throughout the Town of Lysander.

The volume-to-capacity ratio varies from 0.0 to 1.0 and is a comparison of the current or projected traffic on a road or entering an intersection (in this case, the modeled volume) to the maximum traffic volume that the segment or intersection can reasonably be expected to accommodate. Values closer to 1.0 indicate that a segment or intersection is approaching capacity and operational issues may occur (drivers will experience longer delays). The volume-to-capacity ratio is abbreviated "V/C".

Figures 1 and 2 show the V/C ratio for model links (segments) and nodes (intersections) within the Cold Springs Peninsula area of the Town of Lysander and part of the adjoining towns for the AM and PM peak hours, respectively. Both figures show the 2014 Existing Conditions based on the SMTC travel demand model outputs.



**Figure 1 - Lysander 2014 AM Peak Period Conditions**  
SMTC Travel Demand Model Outputs



**Figure 2 - Lysander 2014 PM Peak Period Conditions**  
SMTC Travel Demand Model Outputs

All modeled intersections within the town except one have existing V/C ratios below 0.70, indicating good operation conditions. The intersection of Route 31 and Route 370 (East Genesee Street and Salina Street in the Village of Baldwinsville) is the only intersection with a V/C ratio between 0.7 and 0.9 (and only during the PM peak hour), indicating that drivers likely experience longer delays at this intersection.

The vast majority of modeled road segments show very good existing conditions (V/C ratios less than 0.43, or likely a level of service [LOS] A or B). The segments with higher V/C ratios include Route 31 near Willet Parkway, Route 370 between Hicks Road and River Road, Route 48 south of Route 31/370, and Route 31/370 east of Route 48. However, the V/C ratios for these segments are still relatively low (less than 0.82) indicating that these roads generally experience acceptable operating conditions (LOS C or D). The only road segment that appears to be approaching capacity is Route 370 between River Road and John Glenn Boulevard in the PM peak hour, which carries nearly 1,500 vehicles in the PM peak hour based on the travel demand model. Although Route 31 near the boundary with the Town of Clay carries the highest traffic volume in the town (even more than Route 690), this segment has two travel lanes in each direction and, therefore, has a higher capacity than Route 370.

#### *Existing conditions intersection capacity analysis*

SMTC also conducted capacity analysis at selected intersections to gain more detailed understanding of existing traffic operations at these locations.

Technical Memorandum #1 (August 4, 2014) summarized all of the recent turning movement counts that were conducted by the SMTC, the NYSDOT, and consultants. SMTC staff conducted turning movement counts at five intersections, and conducted a capacity analysis for each of these intersections under AM and PM peak hour conditions. The capacity analysis was conducted using Synchro 7 software. The resulting LOS and delay information is summarized in Table 1 and Table 2 for signalized and unsignalized intersections, respectively. Tables 1 and 2 also include level of service information from the “Timber Banks with YMCA Traffic Assessment – Response to NYSDOT Comments” (GTS Consulting, March 2013) for an additional four intersections. Attachment A contains the reports from Synchro for the five intersections analyzed by the SMTC.

**Table 1: Summary of Existing Conditions Capacity Analysis, Signalized Intersections**

| Intersection                        |                    | AM peak hour  | PM peak hour  |        |
|-------------------------------------|--------------------|---------------|---------------|--------|
| Approach                            | Movement           | LOS (delay)   | LOS (delay)   | Source |
| <b>Route 690 / Hencle Boulevard</b> |                    | <b>B (16)</b> | <b>B (15)</b> | SMTC   |
| Eastbound                           | Left/through/right | B (14)        | B (19)        |        |
| Westbound                           | Left/through       | C (23)        | C (24)        |        |
|                                     | Right              | B (13)        | B (18)        |        |
| Northbound                          | Left               | C (28)        | C (24)        |        |
|                                     | Through            | B (13)        | B (11)        |        |
|                                     | Right              | B (12)        | A (9)         |        |
| Southbound                          | Left               | C (27)        | C (23)        |        |
|                                     | Through            | B (15)        | B (12)        |        |
|                                     | Right              | B (12)        | B (10)        |        |
| <b>Route 370 / Route 48</b>         |                    | <b>B (15)</b> | <b>B (18)</b> | SMTC   |
| Eastbound                           | Left/through       | C (27)        | D (38)        |        |
|                                     | Right              | C (43)        | C (32)        |        |
| Westbound                           | Left               | B (13)        | B (17)        |        |
|                                     | Through/right      | A (7)         | A (10)        |        |
| Northbound                          | Left/through       | C (22)        | C (28)        |        |
|                                     | Right              | A (6)         | A (7)         |        |
| Southbound                          | Left/through/right | C (22)        | C (24)        |        |
| <b>Route 370 / Route 631</b>        |                    | <b>A (7)</b>  | <b>A (7)</b>  | SMTC   |
| Eastbound                           | Left               | A (5)         | A (5)         |        |
|                                     | Through            | A (6)         | A (7)         |        |
| Westbound                           | Through            | A (6)         | A (8)         |        |
|                                     | Right              | A (2)         | A (3)         |        |
| Southbound                          | Left               | B (15)        | B (12)        |        |
|                                     | Right              | B (13)        | B (11)        |        |
| <b>Route 31 / River Road</b>        |                    | <b>C (22)</b> | <b>C (27)</b> | GTS    |
| Eastbound                           | Left               | D (43)        | D (43)        |        |
|                                     | Through            | C (21)        | C (30)        |        |
|                                     | Right              | A (5)         | A (7)         |        |
| Westbound                           | Left               | D (45)        | E (57)        |        |
|                                     | Through/right      | B (14)        | B (19)        |        |
| Northbound                          | Left               | C (22)        | C (28)        |        |
|                                     | Through            | D (38)        | D (37)        |        |
|                                     | Right              | C (25)        | C (22)        |        |
| Southbound                          | Left               | C (29)        | C (24)        |        |
|                                     | Through/Right      | D (36)        | C (33)        |        |

LOS = Level of service. Delay is the average delay per vehicle, in seconds.

Note: Bold text indicates the overall LOS and average delay for a signalized intersection.

Source: SMTC, 2014; “Timber Banks with YMCA Traffic Assessment – Response to NYSDOT Comments” by GTS Consulting, March 2013.

**Table 2: Summary of Existing Conditions Capacity Analysis, Unsignalized Intersections**

| <b>Intersection</b>                            |                    | <b>AM peak hour</b> | <b>PM peak hour</b> | <b>Source</b> |
|------------------------------------------------|--------------------|---------------------|---------------------|---------------|
| <b>Approach</b>                                | <b>Movement</b>    | <b>LOS (delay)</b>  | <b>LOS (delay)</b>  |               |
| <b>Route 370 / Route 690 SB ramps</b>          |                    |                     |                     | SMTC          |
| Eastbound                                      | Left               | B (10)              | B (10)              |               |
| Southbound                                     | Left/right         | C (23)              | C (20)              |               |
| <b>Route 370 / Route 690 NB ramps</b>          |                    |                     |                     | SMTC          |
| Eastbound                                      | Left               | A (8)               | A (8)               |               |
| Southbound                                     | Left               | B (15)              | C (21)              |               |
|                                                | Right              | B (12)              | C (21)              |               |
| <b>Route 370 / Hicks Road / Hayes Road</b>     |                    |                     |                     | GTS           |
| Eastbound                                      | Left/through/right | A (1)               | A (1)               |               |
| Westbound                                      | Left/through/right | A (1)               | A (1)               |               |
| Northbound                                     | Left/through/right | B (15)              | C (21)              |               |
| Southbound                                     | Left/through/right | F (69)              | D (35)              |               |
| <b>Route 370 / River Road</b>                  |                    |                     |                     | GTS           |
| Eastbound                                      | Left/through       | A (1)               | A (1)               |               |
| Westbound                                      | Through/right      | A (0)               | A (0)               |               |
| Southbound                                     | Left/right         | F (95)              | F (193)             |               |
| <b>River Road / Patchett Road / Hicks Road</b> |                    |                     |                     | GTS           |
| Northbound                                     | Left/through/right | A (5)               | A (6)               |               |
| Northwestbound                                 | Left/through/right | A (4)               | A (5)               |               |
| Southbound                                     | Left/through/right | A (7)               | A (9)               |               |
| Eastbound                                      | Left/through/right | A (5)               | A (6)               |               |
| Westbound                                      | Left/through/right | A (3)               | A (3)               |               |

LOS = Level of service. Delay is the average delay per vehicle, in seconds.

Note: For unsignalized intersections, the HCM methodology does not provide an overall LOS or delay.

Source: SMTC, 2014; “Timber Banks with YMCA Traffic Assessment – Response to NYSDOT Comments” by GTS Consulting, March 2013.

The signalized intersections that were examined all operate at good overall levels of service with minimal to moderate delay. Most individual movements operate at LOS A or B with minimal delay. The Route 31/River Road intersection operates with the greatest delay of the intersections considered, although it still operates at an overall LOS C. Some individual movements at this intersection experience greater delay, operating at LOS D or E. The westbound left turn movement from Route 31 to River Road experiences the highest delay – at 57 seconds and LOS E – of any of the movements examined for signalized intersections.

In 2013, the NYSDOT conducted capacity analysis for the Route 370/John Glenn Boulevard intersection in the Town of Salina. This analysis indicates that the intersection operates at an

overall LOS F during the AM peak hour and LOS E during the PM peak hour, with the following individual movements operating at LOS F:

- Route 370 eastbound left (AM)
- Route 370 eastbound through/right (AM and PM)
- Route 370 westbound through/right (PM)
- John Glenn Boulevard northbound left (PM)

Turning movements at the unsignalized intersections that were examined mostly operate at LOS A, B, or C, indicating relatively good operations with little delay to drivers. The exceptions are the southbound movements from River Road to Route 370 and the southbound movements from Hicks Road to Route 370, which operate at LOS D or F. At both of these locations, there is a single southbound lane from which to make all turning movements onto Route 370 and most of the southbound traffic on Hicks Road and River Road turns left onto Route 370. The southbound left turn volume at both of these intersections is approximately 200 vehicles in the AM peak hour and 100 vehicles in the PM peak hour, and the volumes on Route 370 vary from around 700 vehicles per hour to over 1,300 vehicles per hour. The result is that drivers trying to turn onto Route 370 from Hicks Road or River Road may experience delay, on average, of 1 to 3 minutes. According to the “Timber Banks with YMCA Traffic Assessment – Response to NYSDOT Comments” (GTS Consulting, March 2013), both of these locations may be considered for a signal warrant analysis once the reduced initial build out levels for Timber Banks are reached.

### *Summary*

In general, the results of our intersection capacity analysis and review of the travel demand model outputs for segments and intersections indicate that traffic flows quite well in the Town of Lysander under the existing conditions. There are a few isolated areas of moderate concern such as Routes 31/370 and Route 48 near the “four corners” in Baldwinsville and Route 31 near Willett Parkway which may begin to approach capacity in the future, depending on the level of development and amount of new trips that are generated. There are also a few places that currently experience “poor” levels of service. These locations include the unsignalized intersections of Hicks Road and River Road with Route 370, the westbound left-turn movement from Route 31 onto River Road, and Route 370 between River Road and John Glenn Boulevard. Future development plans should be mindful of the potential for additional traffic at these locations, which would exacerbate the existing concerns. Mitigation measures, such as new traffic signals, may need to be considered as part of future development plans; however, this would require additional technical analysis and coordination with the NYSDOT. The cost of installing and maintaining a traffic signal – or any transportation infrastructure that increases capacity – should be weighed against the likely benefit to all residents and the potential to induce additional demand in the future.






















## **Attachment A**

Synchro reports



HCM Signalized Intersection Capacity Analysis  
1: Church Road & Route 48

Existing Conditions  
AM Peak Hour

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |  |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 5                                                                                 | 44                                                                                | 127                                                                               | 158                                                                               | 17                                                                                | 38                                                                                | 33                                                                                  | 228                                                                                 | 67                                                                                  | 41                                                                                  | 444                                                                                 | 3                                                                                   |  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |  |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 |  |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |  |
| Frt                               |                                                                                   | 0.90                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |  |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.96                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |  |
| Satd. Flow (prot)                 |                                                                                   | 1667                                                                              |                                                                                   |                                                                                   | 1663                                                                              | 1615                                                                              | 1492                                                                                | 3312                                                                                | 1429                                                                                | 1687                                                                                | 3374                                                                                | 1615                                                                                |  |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.65                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |  |
| Satd. Flow (perm)                 |                                                                                   | 1649                                                                              |                                                                                   |                                                                                   | 1138                                                                              | 1615                                                                              | 1492                                                                                | 3312                                                                                | 1429                                                                                | 1687                                                                                | 3374                                                                                | 1615                                                                                |  |
| Peak-hour factor, PHF             | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.78                                                                              | 0.78                                                                              | 0.78                                                                              | 0.83                                                                                | 0.83                                                                                | 0.83                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                |  |
| Adj. Flow (vph)                   | 6                                                                                 | 54                                                                                | 157                                                                               | 203                                                                               | 22                                                                                | 49                                                                                | 40                                                                                  | 275                                                                                 | 81                                                                                  | 46                                                                                  | 493                                                                                 | 3                                                                                   |  |
| RTOR Reduction (vph)              | 0                                                                                 | 114                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 | 35                                                                                | 0                                                                                   | 0                                                                                   | 55                                                                                  | 0                                                                                   | 0                                                                                   | 2                                                                                   |  |
| Lane Group Flow (vph)             | 0                                                                                 | 103                                                                               | 0                                                                                 | 0                                                                                 | 225                                                                               | 14                                                                                | 40                                                                                  | 275                                                                                 | 26                                                                                  | 46                                                                                  | 493                                                                                 | 1                                                                                   |  |
| Heavy Vehicles (%)                | 0%                                                                                | 5%                                                                                | 2%                                                                                | 9%                                                                                | 12%                                                                               | 0%                                                                                | 21%                                                                                 | 9%                                                                                  | 13%                                                                                 | 7%                                                                                  | 7%                                                                                  | 0%                                                                                  |  |
| Turn Type                         | Perm                                                                              |                                                                                   |                                                                                   | Perm                                                                              |                                                                                   | Perm                                                                              | Prot                                                                                |                                                                                     | Perm                                                                                | Prot                                                                                |                                                                                     | Perm                                                                                |  |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 5                                                                                   | 2                                                                                   |                                                                                     | 1                                                                                   | 6                                                                                   |                                                                                     |  |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |  |
| Actuated Green, G (s)             |                                                                                   | 13.9                                                                              |                                                                                   |                                                                                   | 13.9                                                                              | 13.9                                                                              | 2.5                                                                                 | 15.9                                                                                | 15.9                                                                                | 2.5                                                                                 | 15.9                                                                                | 15.9                                                                                |  |
| Effective Green, g (s)            |                                                                                   | 13.9                                                                              |                                                                                   |                                                                                   | 13.9                                                                              | 13.9                                                                              | 2.5                                                                                 | 15.9                                                                                | 15.9                                                                                | 2.5                                                                                 | 15.9                                                                                | 15.9                                                                                |  |
| Actuated g/C Ratio                |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | 0.28                                                                              | 0.28                                                                              | 0.05                                                                                | 0.32                                                                                | 0.32                                                                                | 0.05                                                                                | 0.32                                                                                | 0.32                                                                                |  |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 |  |
| Vehicle Extension (s)             |                                                                                   | 2.0                                                                               |                                                                                   |                                                                                   | 2.0                                                                               | 2.0                                                                               | 2.0                                                                                 | 5.7                                                                                 | 5.7                                                                                 | 2.0                                                                                 | 5.7                                                                                 | 5.7                                                                                 |  |
| Lane Grp Cap (vph)                |                                                                                   | 456                                                                               |                                                                                   |                                                                                   | 314                                                                               | 446                                                                               | 74                                                                                  | 1047                                                                                | 452                                                                                 | 84                                                                                  | 1067                                                                                | 511                                                                                 |  |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.03                                                                                | 0.08                                                                                |                                                                                     | c0.03                                                                               | c0.15                                                                               |                                                                                     |  |
| v/s Ratio Perm                    |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                   | c0.20                                                                             | 0.01                                                                              |                                                                                     |                                                                                     | 0.02                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |  |
| v/c Ratio                         |                                                                                   | 0.23                                                                              |                                                                                   |                                                                                   | 0.72                                                                              | 0.03                                                                              | 0.54                                                                                | 0.26                                                                                | 0.06                                                                                | 0.55                                                                                | 0.46                                                                                | 0.00                                                                                |  |
| Uniform Delay, d1                 |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                   | 16.4                                                                              | 13.3                                                                              | 23.3                                                                                | 12.8                                                                                | 12.0                                                                                | 23.3                                                                                | 13.8                                                                                | 11.8                                                                                |  |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |  |
| Incremental Delay, d2             |                                                                                   | 0.1                                                                               |                                                                                   |                                                                                   | 6.4                                                                               | 0.0                                                                               | 4.3                                                                                 | 0.3                                                                                 | 0.1                                                                                 | 3.9                                                                                 | 0.8                                                                                 | 0.0                                                                                 |  |
| Delay (s)                         |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                   | 22.8                                                                              | 13.3                                                                              | 27.6                                                                                | 13.2                                                                                | 12.1                                                                                | 27.2                                                                                | 14.6                                                                                | 11.8                                                                                |  |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 | C                                                                                   | B                                                                                   | B                                                                                   | C                                                                                   | B                                                                                   | B                                                                                   |  |
| Approach Delay (s)                |                                                                                   | 14.1                                                                              |                                                                                   |                                                                                   | 21.1                                                                              |                                                                                   |                                                                                     | 14.4                                                                                |                                                                                     |                                                                                     | 15.7                                                                                |                                                                                     |  |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |  |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 16.1                                                                              |                                                                                   | HCM Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |  |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.58                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.3                                                                              |                                                                                   | Sum of lost time (s)                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     |  |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 55.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |  |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 370 & Route 690 SB

Existing Conditions  
AM Peak Hour



| Movement                          | EBL         | EBT         | WBT         | WBR         | SBL                  | SBR  |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|
| Lane Configurations               |             |             |             |             |                      |      |
| Volume (veh/h)                    | 351         | 188         | 185         | 163         | 10                   | 17   |
| Sign Control                      |             | Free        | Free        |             | Stop                 |      |
| Grade                             |             | 0%          | 0%          |             | 0%                   |      |
| Peak Hour Factor                  | 0.84        | 0.84        | 0.79        | 0.79        | 0.75                 | 0.75 |
| Hourly flow rate (vph)            | 418         | 224         | 234         | 206         | 13                   | 23   |
| 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            | 441         |             |             |             | 1294                 | 234  |
| vC1, stage 1 conf vol             |             |             |             |             |                      |      |
| vC2, stage 2 conf vol             |             |             |             |             |                      |      |
| vCu, unblocked vol                | 441         |             |             |             | 1294                 | 234  |
| tC, single (s)                    | 4.1         |             |             |             | 6.5                  | 6.2  |
| tC, 2 stage (s)                   |             |             |             |             |                      |      |
| tF (s)                            | 2.2         |             |             |             | 3.6                  | 3.3  |
| p0 queue free %                   | 62          |             |             |             | 88                   | 97   |
| cM capacity (veh/h)               | 1114        |             |             |             | 108                  | 810  |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>EB 2</b> | <b>WB 1</b> | <b>WB 2</b> | <b>SB 1</b>          |      |
| Volume Total                      | 418         | 224         | 234         | 206         | 36                   |      |
| Volume Left                       | 418         | 0           | 0           | 0           | 13                   |      |
| Volume Right                      | 0           | 0           | 0           | 206         | 23                   |      |
| cSH                               | 1114        | 1700        | 1700        | 1700        | 238                  |      |
| Volume to Capacity                | 0.38        | 0.13        | 0.14        | 0.12        | 0.15                 |      |
| Queue Length 95th (ft)            | 44          | 0           | 0           | 0           | 13                   |      |
| Control Delay (s)                 | 10.2        | 0.0         | 0.0         | 0.0         | 22.8                 |      |
| Lane LOS                          | B           |             |             |             | C                    |      |
| Approach Delay (s)                | 6.6         |             | 0.0         |             | 22.8                 |      |
| Approach LOS                      |             |             |             |             | C                    |      |
| <b>Intersection Summary</b>       |             |             |             |             |                      |      |
| Average Delay                     |             |             | 4.5         |             |                      |      |
| Intersection Capacity Utilization |             |             | 42.5%       |             | ICU Level of Service | A    |
| Analysis Period (min)             |             |             | 15          |             |                      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Route 370 & Route 690 NB





















Existing Conditions  
AM Peak Hour



| Movement                          | EBL  | EBT  | WBT   | WBR  | SBL                  | SBR  |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations               | ↖    | ↑    | ↗     | ↘    | ↙                    | ↘    |
| Volume (veh/h)                    | 18   | 187  | 242   | 10   | 61                   | 111  |
| Sign Control                      |      | Free | Free  |      | Stop                 |      |
| Grade                             |      | 0%   | 0%    |      | 0%                   |      |
| Peak Hour Factor                  | 0.93 | 0.93 | 0.69  | 0.69 | 0.78                 | 0.78 |
| Hourly flow rate (vph)            | 19   | 201  | 351   | 14   | 78                   | 142  |
| 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            | 365  |      |       |      | 591                  | 351  |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 365  |      |       |      | 591                  | 351  |
| tC, single (s)                    | 4.1  |      |       |      | 6.5                  | 6.3  |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 2.2  |      |       |      | 3.6                  | 3.4  |
| p0 queue free %                   | 98   |      |       |      | 82                   | 79   |
| cM capacity (veh/h)               | 1204 |      |       |      | 445                  | 677  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2 | SB 1                 | SB 2 |
| Volume Total                      | 19   | 201  | 351   | 14   | 78                   | 142  |
| Volume Left                       | 19   | 0    | 0     | 0    | 78                   | 0    |
| Volume Right                      | 0    | 0    | 0     | 14   | 0                    | 142  |
| cSH                               | 1204 | 1700 | 1700  | 1700 | 445                  | 677  |
| Volume to Capacity                | 0.02 | 0.12 | 0.21  | 0.01 | 0.18                 | 0.21 |
| Queue Length 95th (ft)            | 1    | 0    | 0     | 0    | 16                   | 20   |
| Control Delay (s)                 | 8.0  | 0.0  | 0.0   | 0.0  | 14.8                 | 11.7 |
| Lane LOS                          | A    |      |       |      | B                    | B    |
| Approach Delay (s)                | 0.7  |      | 0.0   |      | 12.8                 |      |
| Approach LOS                      |      |      |       |      | B                    |      |
| Intersection Summary              |      |      |       |      |                      |      |
| Average Delay                     |      |      | 3.7   |      |                      |      |
| Intersection Capacity Utilization |      |      | 26.3% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |

HCM Signalized Intersection Capacity Analysis  
4: Route 370/Route 31 & Route 48

Existing Conditions  
AM Peak Hour

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |                      |   |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|---|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |                      |   |
| Lane Configurations               |                                                                                   |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |                      |   |
| Volume (vph)                      | 4                                                                                 | 187                                                                               | 86                                                                                | 436                                                                               | 134                                                                               | 28                                                                                | 43                                                                                 | 130                                                                                 | 432                                                                                 | 3                                                                                   | 179                                                                                 | 7                                                                                   |                      |   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                      |   |
| Lane Width                        | 12                                                                                | 11                                                                                | 10                                                                                | 12                                                                                | 11                                                                                | 13                                                                                | 12                                                                                 | 12                                                                                  | 13                                                                                  | 12                                                                                  | 16                                                                                  | 12                                                                                  |                      |   |
| Total Lost time (s)               |                                                                                   | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   |                                                                                    | 5.5                                                                                 | 5.5                                                                                 |                                                                                     | 5.5                                                                                 |                                                                                     |                      |   |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Frbp, ped/bikes                   |                                                                                   | 1.00                                                                              | 0.98                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Flpb, ped/bikes                   |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Frt                               |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Flt Protected                     |                                                                                   | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.99                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Satd. Flow (prot)                 |                                                                                   | 1774                                                                              | 1276                                                                              | 1735                                                                              | 1674                                                                              |                                                                                   |                                                                                    | 1546                                                                                | 1636                                                                                |                                                                                     | 1733                                                                                |                                                                                     |                      |   |
| Flt Permitted                     |                                                                                   | 0.99                                                                              | 1.00                                                                              | 0.40                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.87                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Satd. Flow (perm)                 |                                                                                   | 1763                                                                              | 1276                                                                              | 735                                                                               | 1674                                                                              |                                                                                   |                                                                                    | 1368                                                                                | 1636                                                                                |                                                                                     | 1726                                                                                |                                                                                     |                      |   |
| Peak-hour factor, PHF             | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.89                                                                               | 0.89                                                                                | 0.89                                                                                | 0.77                                                                                | 0.77                                                                                | 0.77                                                                                |                      |   |
| Adj. Flow (vph)                   | 4                                                                                 | 197                                                                               | 91                                                                                | 513                                                                               | 158                                                                               | 33                                                                                | 48                                                                                 | 146                                                                                 | 485                                                                                 | 4                                                                                   | 232                                                                                 | 9                                                                                   |                      |   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                      |   |
| Lane Group Flow (vph)             | 0                                                                                 | 201                                                                               | 91                                                                                | 513                                                                               | 191                                                                               | 0                                                                                 | 0                                                                                  | 194                                                                                 | 485                                                                                 | 0                                                                                   | 245                                                                                 | 0                                                                                   |                      |   |
| Confl. Peds. (#/hr)               | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 4                                                                                  |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 4                                                                                   |                      |   |
| Heavy Vehicles (%)                | 25%                                                                               | 3%                                                                                | 4%                                                                                | 4%                                                                                | 7%                                                                                | 4%                                                                                | 7%                                                                                 | 26%                                                                                 | 2%                                                                                  | 0%                                                                                  | 10%                                                                                 | 43%                                                                                 |                      |   |
| Parking (#/hr)                    |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                      |   |
| Turn Type                         | Perm                                                                              |                                                                                   | Perm                                                                              | pm+pt                                                                             |                                                                                   |                                                                                   | pm+pt                                                                              |                                                                                     | pt+ov                                                                               | Perm                                                                                |                                                                                     |                                                                                     |                      |   |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 7                                                                                  | 4                                                                                   | 4                                                                                   | 1                                                                                   |                                                                                     | 8                                                                                   |                      |   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   | 4                                                                                  |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                      |   |
| Actuated Green, G (s)             |                                                                                   | 13.9                                                                              | 13.9                                                                              | 38.9                                                                              | 38.9                                                                              |                                                                                   |                                                                                    | 19.1                                                                                | 44.6                                                                                |                                                                                     | 19.1                                                                                |                                                                                     |                      |   |
| Effective Green, g (s)            |                                                                                   | 13.9                                                                              | 13.9                                                                              | 38.9                                                                              | 38.9                                                                              |                                                                                   |                                                                                    | 19.1                                                                                | 44.6                                                                                |                                                                                     | 19.1                                                                                |                                                                                     |                      |   |
| Actuated g/C Ratio                |                                                                                   | 0.20                                                                              | 0.20                                                                              | 0.57                                                                              | 0.57                                                                              |                                                                                   |                                                                                    | 0.28                                                                                | 0.65                                                                                |                                                                                     | 0.28                                                                                |                                                                                     |                      |   |
| Clearance Time (s)                |                                                                                   | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   |                                                                                    | 5.5                                                                                 |                                                                                     |                                                                                     | 5.5                                                                                 |                                                                                     |                      |   |
| Vehicle Extension (s)             |                                                                                   | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   |                                                                                    | 3.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |                      |   |
| Lane Grp Cap (vph)                |                                                                                   | 358                                                                               | 259                                                                               | 709                                                                               | 951                                                                               |                                                                                   |                                                                                    | 381                                                                                 | 1065                                                                                |                                                                                     | 481                                                                                 |                                                                                     |                      |   |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   | c0.21                                                                             | 0.11                                                                              |                                                                                   |                                                                                    |                                                                                     | c0.30                                                                               |                                                                                     |                                                                                     |                                                                                     |                      |   |
| v/s Ratio Perm                    |                                                                                   | 0.11                                                                              | 0.07                                                                              | c0.20                                                                             |                                                                                   |                                                                                   |                                                                                    | 0.14                                                                                |                                                                                     |                                                                                     | 0.14                                                                                |                                                                                     |                      |   |
| v/c Ratio                         |                                                                                   | 0.56                                                                              | 0.35                                                                              | 0.72                                                                              | 0.20                                                                              |                                                                                   |                                                                                    | 0.51                                                                                | 0.46                                                                                |                                                                                     | 0.51                                                                                |                                                                                     |                      |   |
| Uniform Delay, d1                 |                                                                                   | 24.6                                                                              | 23.4                                                                              | 9.7                                                                               | 7.2                                                                               |                                                                                   |                                                                                    | 20.8                                                                                | 5.9                                                                                 |                                                                                     | 20.8                                                                                |                                                                                     |                      |   |
| Progression Factor                |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |                                                                                     |                      |   |
| Incremental Delay, d2             |                                                                                   | 2.0                                                                               | 0.8                                                                               | 3.7                                                                               | 0.1                                                                               |                                                                                   |                                                                                    | 1.1                                                                                 | 0.3                                                                                 |                                                                                     | 0.9                                                                                 |                                                                                     |                      |   |
| Delay (s)                         |                                                                                   | 26.6                                                                              | 24.3                                                                              | 13.4                                                                              | 7.3                                                                               |                                                                                   |                                                                                    | 21.8                                                                                | 6.2                                                                                 |                                                                                     | 21.6                                                                                |                                                                                     |                      |   |
| Level of Service                  |                                                                                   | C                                                                                 | C                                                                                 | B                                                                                 | A                                                                                 |                                                                                   |                                                                                    | C                                                                                   | A                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                      |   |
| Approach Delay (s)                |                                                                                   | 25.9                                                                              |                                                                                   |                                                                                   | 11.7                                                                              |                                                                                   |                                                                                    | 10.7                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                      |   |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                      |   |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                      |   |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 14.8                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | HCM Level of Service                                                                | B                    |   |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.64                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                      |   |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 68.5                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     | 10.5                                                                                |                                                                                     |                      |   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 76.3%                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | ICU Level of Service | D |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                      |   |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                      |   |

HCM Signalized Intersection Capacity Analysis  
5: Route 370 & Route 631

Existing Conditions  
AM Peak Hour
























| Movement               | EBL  | EBT   | WBT  | WBR   | SBL   | SBR  |
|------------------------|------|-------|------|-------|-------|------|
| Lane Configurations    |      |       |      |       |       |      |
| Volume (vph)           | 8    | 236   | 232  | 79    | 74    | 2    |
| Ideal Flow (vphpl)     | 1900 | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width             | 12   | 12    | 10   | 12    | 12    | 12   |
| Total Lost time (s)    | 6.5  | 6.5   | 6.5  | 6.0   | 6.0   | 6.0  |
| Lane Util. Factor      | 1.00 | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Frt                    | 1.00 | 1.00  | 1.00 | 0.85  | 1.00  | 0.85 |
| Flt Protected          | 0.95 | 1.00  | 1.00 | 1.00  | 0.95  | 1.00 |
| Satd. Flow (prot)      | 1597 | 1810  | 1689 | 1495  | 1626  | 1615 |
| Flt Permitted          | 0.60 | 1.00  | 1.00 | 1.00  | 0.95  | 1.00 |
| Satd. Flow (perm)      | 1003 | 1810  | 1689 | 1495  | 1626  | 1615 |
| Peak-hour factor, PHF  | 0.80 | 0.80  | 0.88 | 0.88  | 0.71  | 0.71 |
| Adj. Flow (vph)        | 10   | 295   | 264  | 90    | 104   | 3    |
| RTOR Reduction (vph)   | 0    | 0     | 0    | 0     | 0     | 3    |
| Lane Group Flow (vph)  | 10   | 295   | 264  | 90    | 104   | 0    |
| Heavy Vehicles (%)     | 13%  | 5%    | 5%   | 8%    | 11%   | 0%   |
| Turn Type              | Perm |       |      | pm+ov |       | Perm |
| Protected Phases       |      | 6     | 2    | 4     | 4     |      |
| Permitted Phases       | 6    |       |      | 2     |       | 4    |
| Actuated Green, G (s)  | 18.8 | 18.8  | 18.8 | 24.2  | 5.4   | 5.4  |
| Effective Green, g (s) | 18.8 | 18.8  | 18.8 | 24.2  | 5.4   | 5.4  |
| Actuated g/C Ratio     | 0.51 | 0.51  | 0.51 | 0.66  | 0.15  | 0.15 |
| Clearance Time (s)     | 6.5  | 6.5   | 6.5  | 6.0   | 6.0   | 6.0  |
| Vehicle Extension (s)  | 6.0  | 6.0   | 6.0  | 2.0   | 2.0   | 2.0  |
| Lane Grp Cap (vph)     | 514  | 927   | 865  | 1230  | 239   | 238  |
| v/s Ratio Prot         |      | c0.16 | 0.16 | 0.01  | c0.06 |      |
| v/s Ratio Perm         | 0.01 |       |      | 0.05  |       | 0.00 |
| v/c Ratio              | 0.02 | 0.32  | 0.31 | 0.07  | 0.44  | 0.00 |
| Uniform Delay, d1      | 4.4  | 5.2   | 5.2  | 2.2   | 14.3  | 13.4 |
| Progression Factor     | 1.00 | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Incremental Delay, d2  | 0.0  | 0.6   | 0.6  | 0.0   | 0.5   | 0.0  |
| Delay (s)              | 4.5  | 5.8   | 5.7  | 2.2   | 14.7  | 13.4 |
| Level of Service       | A    | A     | A    | A     | B     | B    |
| Approach Delay (s)     |      | 5.7   | 4.9  |       | 14.7  |      |
| Approach LOS           |      | A     | A    |       | B     |      |

| Intersection Summary              |  |       |                      |      |
|-----------------------------------|--|-------|----------------------|------|
| HCM Average Control Delay         |  | 6.6   | HCM Level of Service | A    |
| HCM Volume to Capacity ratio      |  | 0.34  |                      |      |
| Actuated Cycle Length (s)         |  | 36.7  | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization |  | 30.4% | ICU Level of Service | A    |
| Analysis Period (min)             |  | 15    |                      |      |
| c Critical Lane Group             |  |       |                      |      |

HCM Signalized Intersection Capacity Analysis  
1: Church Road & Route 48

Existing Conditions  
PM Peak Hour

|                                   |  |  |  |  |  |  |   |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 2                                                                                 | 36                                                                                | 55                                                                                | 89                                                                                | 35                                                                                | 43                                                                                | 121                                                                                 | 534                                                                                 | 155                                                                                 | 62                                                                                  | 301                                                                                 | 3                                                                                   |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 |
| Lane Util. Factor                 |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |
| Frt                               |                                                                                   | 0.92                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 0.85                                                                              | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 0.97                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 |                                                                                   | 1746                                                                              |                                                                                   |                                                                                   | 1656                                                                              | 1615                                                                              | 1787                                                                                | 3539                                                                                | 1442                                                                                | 1770                                                                                | 3282                                                                                | 1615                                                                                |
| Flt Permitted                     |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   | 0.81                                                                              | 1.00                                                                              | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 |                                                                                   | 1728                                                                              |                                                                                   |                                                                                   | 1382                                                                              | 1615                                                                              | 1787                                                                                | 3539                                                                                | 1442                                                                                | 1770                                                                                | 3282                                                                                | 1615                                                                                |
| Peak-hour factor, PHF             | 0.69                                                                              | 0.69                                                                              | 0.69                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.89                                                                                | 0.89                                                                                | 0.89                                                                                |
| Adj. Flow (vph)                   | 3                                                                                 | 52                                                                                | 80                                                                                | 97                                                                                | 38                                                                                | 47                                                                                | 132                                                                                 | 580                                                                                 | 168                                                                                 | 70                                                                                  | 338                                                                                 | 3                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 67                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 40                                                                                | 0                                                                                   | 0                                                                                   | 100                                                                                 | 0                                                                                   | 0                                                                                   | 2                                                                                   |
| Lane Group Flow (vph)             | 0                                                                                 | 68                                                                                | 0                                                                                 | 0                                                                                 | 135                                                                               | 7                                                                                 | 132                                                                                 | 580                                                                                 | 68                                                                                  | 70                                                                                  | 338                                                                                 | 1                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 15%                                                                               | 0%                                                                                | 0%                                                                                | 1%                                                                                  | 2%                                                                                  | 12%                                                                                 | 2%                                                                                  | 10%                                                                                 | 0%                                                                                  |
| Turn Type                         | Perm                                                                              |                                                                                   |                                                                                   | Perm                                                                              |                                                                                   | Perm                                                                              | Prot                                                                                |                                                                                     | Perm                                                                                | Prot                                                                                |                                                                                     | Perm                                                                                |
| Protected Phases                  |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 5                                                                                   | 2                                                                                   |                                                                                     | 1                                                                                   | 6                                                                                   |                                                                                     |
| Permitted Phases                  | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   | 8                                                                                 |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 6                                                                                   |
| Actuated Green, G (s)             |                                                                                   | 7.9                                                                               |                                                                                   |                                                                                   | 7.9                                                                               | 7.9                                                                               | 6.1                                                                                 | 20.3                                                                                | 20.3                                                                                | 4.0                                                                                 | 18.2                                                                                | 18.2                                                                                |
| Effective Green, g (s)            |                                                                                   | 7.9                                                                               |                                                                                   |                                                                                   | 7.9                                                                               | 7.9                                                                               | 6.1                                                                                 | 20.3                                                                                | 20.3                                                                                | 4.0                                                                                 | 18.2                                                                                | 18.2                                                                                |
| Actuated g/C Ratio                |                                                                                   | 0.16                                                                              |                                                                                   |                                                                                   | 0.16                                                                              | 0.16                                                                              | 0.12                                                                                | 0.40                                                                                | 0.40                                                                                | 0.08                                                                                | 0.36                                                                                | 0.36                                                                                |
| Clearance Time (s)                |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               | 6.0                                                                               | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 | 5.0                                                                                 | 7.0                                                                                 | 7.0                                                                                 |
| Vehicle Extension (s)             |                                                                                   | 2.0                                                                               |                                                                                   |                                                                                   | 2.0                                                                               | 2.0                                                                               | 2.0                                                                                 | 5.7                                                                                 | 5.7                                                                                 | 2.0                                                                                 | 5.7                                                                                 | 5.7                                                                                 |
| Lane Grp Cap (vph)                |                                                                                   | 272                                                                               |                                                                                   |                                                                                   | 217                                                                               | 254                                                                               | 217                                                                                 | 1431                                                                                | 583                                                                                 | 141                                                                                 | 1190                                                                                | 586                                                                                 |
| v/s Ratio Prot                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | c0.07                                                                               | c0.16                                                                               |                                                                                     | 0.04                                                                                | 0.10                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   | 0.04                                                                              |                                                                                   |                                                                                   | c0.10                                                                             | 0.00                                                                              |                                                                                     |                                                                                     | 0.05                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |
| v/c Ratio                         |                                                                                   | 0.25                                                                              |                                                                                   |                                                                                   | 0.62                                                                              | 0.03                                                                              | 0.61                                                                                | 0.41                                                                                | 0.12                                                                                | 0.50                                                                                | 0.28                                                                                | 0.00                                                                                |
| Uniform Delay, d1                 |                                                                                   | 18.5                                                                              |                                                                                   |                                                                                   | 19.8                                                                              | 17.9                                                                              | 20.9                                                                                | 10.7                                                                                | 9.3                                                                                 | 22.1                                                                                | 11.4                                                                                | 10.2                                                                                |
| Progression Factor                |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             |                                                                                   | 0.2                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 0.0                                                                               | 3.3                                                                                 | 0.5                                                                                 | 0.2                                                                                 | 1.0                                                                                 | 0.3                                                                                 | 0.0                                                                                 |
| Delay (s)                         |                                                                                   | 18.7                                                                              |                                                                                   |                                                                                   | 23.7                                                                              | 17.9                                                                              | 24.2                                                                                | 11.1                                                                                | 9.6                                                                                 | 23.1                                                                                | 11.7                                                                                | 10.2                                                                                |
| Level of Service                  |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 | B                                                                                 | C                                                                                   | B                                                                                   | A                                                                                   | C                                                                                   | B                                                                                   | B                                                                                   |
| Approach Delay (s)                |                                                                                   | 18.7                                                                              |                                                                                   |                                                                                   | 22.2                                                                              |                                                                                   |                                                                                     | 12.8                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM Average Control Delay         |                                                                                   |                                                                                   | 14.6                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM Level of Service                                                                |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| HCM Volume to Capacity ratio      |                                                                                   |                                                                                   | 0.43                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 50.2                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     |                                                                                     | 11.0                                                                                |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 47.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

c Critical Lane Group

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 370 & Route 690 SB

Existing Conditions  
PM Peak Hour

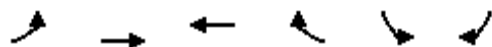


| Movement                          | EBL         | EBT         | WBT         | WBR         | SBL                  | SBR  |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|
| Lane Configurations               |             |             |             |             |                      |      |
| Volume (veh/h)                    | 156         | 174         | 586         | 114         | 11                   | 21   |
| Sign Control                      |             | Free        | Free        |             | Stop                 |      |
| Grade                             |             | 0%          | 0%          |             | 0%                   |      |
| Peak Hour Factor                  | 0.95        | 0.95        | 0.88        | 0.88        | 0.89                 | 0.89 |
| Hourly flow rate (vph)            | 164         | 183         | 666         | 130         | 12                   | 24   |
| 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            | 795         |             |             |             | 1177                 | 666  |
| vC1, stage 1 conf vol             |             |             |             |             |                      |      |
| vC2, stage 2 conf vol             |             |             |             |             |                      |      |
| vCu, unblocked vol                | 795         |             |             |             | 1177                 | 666  |
| tC, single (s)                    | 4.1         |             |             |             | 6.5                  | 6.3  |
| tC, 2 stage (s)                   |             |             |             |             |                      |      |
| tF (s)                            | 2.2         |             |             |             | 3.6                  | 3.4  |
| p0 queue free %                   | 80          |             |             |             | 92                   | 95   |
| cM capacity (veh/h)               | 826         |             |             |             | 164                  | 446  |
| <b>Direction, Lane #</b>          | <b>EB 1</b> | <b>EB 2</b> | <b>WB 1</b> | <b>WB 2</b> | <b>SB 1</b>          |      |
| Volume Total                      | 164         | 183         | 666         | 130         | 36                   |      |
| Volume Left                       | 164         | 0           | 0           | 0           | 12                   |      |
| Volume Right                      | 0           | 0           | 0           | 130         | 24                   |      |
| cSH                               | 826         | 1700        | 1700        | 1700        | 280                  |      |
| Volume to Capacity                | 0.20        | 0.11        | 0.39        | 0.08        | 0.13                 |      |
| Queue Length 95th (ft)            | 18          | 0           | 0           | 0           | 11                   |      |
| Control Delay (s)                 | 10.4        | 0.0         | 0.0         | 0.0         | 19.7                 |      |
| Lane LOS                          | B           |             |             |             | C                    |      |
| Approach Delay (s)                | 4.9         |             | 0.0         |             | 19.7                 |      |
| Approach LOS                      |             |             |             |             | C                    |      |
| <b>Intersection Summary</b>       |             |             |             |             |                      |      |
| Average Delay                     |             |             | 2.1         |             |                      |      |
| Intersection Capacity Utilization |             |             | 52.8%       |             | ICU Level of Service | A    |
| Analysis Period (min)             |             |             | 15          |             |                      |      |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Route 370 & Route 690 NB

Existing Conditions  
PM Peak Hour



| Movement                          | EBL  | EBT  | WBT   | WBR  | SBL                  | SBR  |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations               |      |      |       |      |                      |      |
| Volume (veh/h)                    | 14   | 167  | 325   | 17   | 196                  | 396  |
| Sign Control                      |      | Free | Free  |      | Stop                 |      |
| Grade                             |      | 0%   | 0%    |      | 0%                   |      |
| Peak Hour Factor                  | 0.77 | 0.77 | 0.93  | 0.93 | 0.83                 | 0.83 |
| Hourly flow rate (vph)            | 18   | 217  | 349   | 18   | 236                  | 477  |
| 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            | 368  |      |       |      | 603                  | 349  |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 368  |      |       |      | 603                  | 349  |
| tC, single (s)                    | 4.2  |      |       |      | 6.4                  | 6.2  |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 2.3  |      |       |      | 3.5                  | 3.3  |
| p0 queue free %                   | 98   |      |       |      | 48                   | 31   |
| cM capacity (veh/h)               | 1164 |      |       |      | 455                  | 694  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2 | SB 1                 | SB 2 |
| Volume Total                      | 18   | 217  | 349   | 18   | 236                  | 477  |
| Volume Left                       | 18   | 0    | 0     | 0    | 236                  | 0    |
| Volume Right                      | 0    | 0    | 0     | 18   | 0                    | 477  |
| cSH                               | 1164 | 1700 | 1700  | 1700 | 455                  | 694  |
| Volume to Capacity                | 0.02 | 0.13 | 0.21  | 0.01 | 0.52                 | 0.69 |
| Queue Length 95th (ft)            | 1    | 0    | 0     | 0    | 73                   | 137  |
| Control Delay (s)                 | 8.1  | 0.0  | 0.0   | 0.0  | 21.1                 | 20.8 |
| Lane LOS                          | A    |      |       |      | C                    | C    |
| Approach Delay (s)                | 0.6  |      | 0.0   |      | 20.9                 |      |
| Approach LOS                      |      |      |       |      | C                    |      |
| Intersection Summary              |      |      |       |      |                      |      |
| Average Delay                     |      |      | 11.4  |      |                      |      |
| Intersection Capacity Utilization |      |      | 48.3% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |



# HCM Signalized Intersection Capacity Analysis

## 4: Route 370/Route 31 & Route 48

Existing Conditions  
PM Peak Hour



| Movement               | EBL  | EBT  | EBR  | WBL   | WBT  | WBR  | NBL   | NBT   | NBR   | SBL  | SBT  | SBR  |
|------------------------|------|------|------|-------|------|------|-------|-------|-------|------|------|------|
| Lane Configurations    |      | ↖    | ↗    | ↖     | ↗    |      |       | ↖     | ↗     |      | ↕    |      |
| Volume (vph)           | 4    | 200  | 84   | 519   | 182  | 45   | 80    | 183   | 576   | 1    | 184  | 5    |
| Ideal Flow (vphpl)     | 1900 | 1900 | 1900 | 1900  | 1900 | 1900 | 1900  | 1900  | 1900  | 1900 | 1900 | 1900 |
| Lane Width             | 12   | 11   | 10   | 12    | 11   | 13   | 12    | 12    | 13    | 12   | 16   | 12   |
| Total Lost time (s)    |      | 5.0  | 5.0  | 5.0   | 5.0  |      |       | 5.5   | 5.5   |      | 5.5  |      |
| Lane Util. Factor      |      | 1.00 | 1.00 | 1.00  | 1.00 |      |       | 1.00  | 1.00  |      | 1.00 |      |
| Frbp, ped/bikes        |      | 1.00 | 0.96 | 1.00  | 0.99 |      |       | 1.00  | 1.00  |      | 1.00 |      |
| Flpb, ped/bikes        |      | 1.00 | 1.00 | 1.00  | 1.00 |      |       | 1.00  | 1.00  |      | 1.00 |      |
| Frt                    |      | 1.00 | 0.85 | 1.00  | 0.97 |      |       | 1.00  | 0.85  |      | 1.00 |      |
| Flt Protected          |      | 1.00 | 1.00 | 0.95  | 1.00 |      |       | 0.99  | 1.00  |      | 1.00 |      |
| Satd. Flow (prot)      |      | 1799 | 1307 | 1801  | 1742 |      |       | 1850  | 1652  |      | 1911 |      |
| Flt Permitted          |      | 0.99 | 1.00 | 0.33  | 1.00 |      |       | 0.79  | 1.00  |      | 1.00 |      |
| Satd. Flow (perm)      |      | 1789 | 1307 | 618   | 1742 |      |       | 1488  | 1652  |      | 1909 |      |
| Peak-hour factor, PHF  | 0.91 | 0.91 | 0.91 | 0.93  | 0.93 | 0.93 | 0.94  | 0.94  | 0.94  | 0.82 | 0.82 | 0.82 |
| Adj. Flow (vph)        | 4    | 220  | 92   | 558   | 196  | 48   | 85    | 195   | 613   | 1    | 224  | 6    |
| RTOR Reduction (vph)   | 0    | 0    | 0    | 0     | 0    | 0    | 0     | 0     | 0     | 0    | 0    | 0    |
| Lane Group Flow (vph)  | 0    | 224  | 92   | 558   | 244  | 0    | 0     | 280   | 613   | 0    | 231  | 0    |
| Confl. Peds. (#/hr)    | 6    |      | 8    | 6     |      | 8    | 6     |       | 11    | 11   |      | 6    |
| Heavy Vehicles (%)     | 0%   | 2%   | 0%   | 0%    | 2%   | 0%   | 1%    | 1%    | 1%    | 0%   | 1%   | 0%   |
| Parking (#/hr)         |      |      | 0    |       |      |      |       |       |       |      |      | 0    |
| Turn Type              | Perm |      | Perm | pm+pt |      |      | pm+pt |       | pt+ov |      | Perm |      |
| Protected Phases       |      | 2    |      | 1     | 6    |      | 7     | 4     | 4     | 1    |      | 8    |
| Permitted Phases       | 2    |      | 2    | 6     |      |      | 4     |       |       |      | 8    |      |
| Actuated Green, G (s)  |      | 16.2 | 16.2 | 49.5  | 49.5 |      |       | 26.8  | 60.6  |      | 26.8 |      |
| Effective Green, g (s) |      | 16.2 | 16.2 | 49.5  | 49.5 |      |       | 26.8  | 60.6  |      | 26.8 |      |
| Actuated g/C Ratio     |      | 0.19 | 0.19 | 0.57  | 0.57 |      |       | 0.31  | 0.70  |      | 0.31 |      |
| Clearance Time (s)     |      | 5.0  | 5.0  | 5.0   | 5.0  |      |       | 5.5   |       |      | 5.5  |      |
| Vehicle Extension (s)  |      | 3.0  | 3.0  | 3.0   | 3.0  |      |       | 3.0   |       |      | 3.0  |      |
| Lane Grp Cap (vph)     |      | 334  | 244  | 738   | 993  |      |       | 459   | 1153  |      | 589  |      |
| v/s Ratio Prot         |      |      |      | c0.25 | 0.14 |      |       |       | 0.37  |      |      |      |
| v/s Ratio Perm         |      | 0.13 | 0.07 | c0.18 |      |      |       | c0.19 |       |      | 0.12 |      |
| v/c Ratio              |      | 0.67 | 0.38 | 0.76  | 0.25 |      |       | 0.61  | 0.53  |      | 0.39 |      |
| Uniform Delay, d1      |      | 32.8 | 30.9 | 12.7  | 9.3  |      |       | 25.5  | 6.3   |      | 23.6 |      |
| Progression Factor     |      | 1.00 | 1.00 | 1.00  | 1.00 |      |       | 1.00  | 1.00  |      | 1.00 |      |
| Incremental Delay, d2  |      | 5.2  | 1.0  | 4.4   | 0.1  |      |       | 2.4   | 0.5   |      | 0.4  |      |
| Delay (s)              |      | 38.0 | 31.9 | 17.2  | 9.5  |      |       | 27.9  | 6.8   |      | 24.0 |      |
| Level of Service       |      | D    | C    | B     | A    |      |       | C     | A     |      | C    |      |
| Approach Delay (s)     |      | 36.2 |      |       | 14.8 |      |       | 13.4  |       |      | 24.0 |      |
| Approach LOS           |      | D    |      |       | B    |      |       | B     |       |      | C    |      |

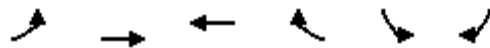
### Intersection Summary

|                                   |       |                      |      |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay         | 18.2  | HCM Level of Service | B    |
| HCM Volume to Capacity ratio      | 0.69  |                      |      |
| Actuated Cycle Length (s)         | 86.8  | Sum of lost time (s) | 10.5 |
| Intersection Capacity Utilization | 85.9% | ICU Level of Service | E    |
| Analysis Period (min)             | 15    |                      |      |
| c Critical Lane Group             |       |                      |      |

# HCM Signalized Intersection Capacity Analysis

## 5: Route 370 & Route 631

Existing Conditions  
PM Peak Hour



| Movement               | EBL  | EBT  | WBT   | WBR   | SBL   | SBR  |
|------------------------|------|------|-------|-------|-------|------|
| Lane Configurations    |      |      |       |       |       |      |
| Volume (vph)           | 26   | 297  | 343   | 99    | 73    | 14   |
| Ideal Flow (vphpl)     | 1900 | 1900 | 1900  | 1900  | 1900  | 1900 |
| Lane Width             | 12   | 12   | 10    | 12    | 12    | 12   |
| Total Lost time (s)    | 6.5  | 6.5  | 6.5   | 6.0   | 6.0   | 6.0  |
| Lane Util. Factor      | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| Frt                    | 1.00 | 1.00 | 1.00  | 0.85  | 1.00  | 0.85 |
| Flt Protected          | 0.95 | 1.00 | 1.00  | 1.00  | 0.95  | 1.00 |
| Satd. Flow (prot)      | 1736 | 1881 | 1756  | 1583  | 1787  | 1615 |
| Flt Permitted          | 0.53 | 1.00 | 1.00  | 1.00  | 0.95  | 1.00 |
| Satd. Flow (perm)      | 971  | 1881 | 1756  | 1583  | 1787  | 1615 |
| Peak-hour factor, PHF  | 0.78 | 0.78 | 0.88  | 0.88  | 0.99  | 0.99 |
| Adj. Flow (vph)        | 33   | 381  | 390   | 112   | 74    | 14   |
| RTOR Reduction (vph)   | 0    | 0    | 0     | 0     | 0     | 12   |
| Lane Group Flow (vph)  | 33   | 381  | 390   | 112   | 74    | 2    |
| Heavy Vehicles (%)     | 4%   | 1%   | 1%    | 2%    | 1%    | 0%   |
| Turn Type              | Perm |      |       | pm+ov |       | Perm |
| Protected Phases       |      | 6    | 2     | 4     | 4     |      |
| Permitted Phases       | 6    |      |       | 2     |       | 4    |
| Actuated Green, G (s)  | 13.0 | 13.0 | 13.0  | 17.6  | 4.6   | 4.6  |
| Effective Green, g (s) | 13.0 | 13.0 | 13.0  | 17.6  | 4.6   | 4.6  |
| Actuated g/C Ratio     | 0.43 | 0.43 | 0.43  | 0.58  | 0.15  | 0.15 |
| Clearance Time (s)     | 6.5  | 6.5  | 6.5   | 6.0   | 6.0   | 6.0  |
| Vehicle Extension (s)  | 6.0  | 6.0  | 6.0   | 2.0   | 2.0   | 2.0  |
| Lane Grp Cap (vph)     | 419  | 812  | 758   | 1241  | 273   | 247  |
| v/s Ratio Prot         |      | 0.20 | c0.22 | 0.01  | c0.04 |      |
| v/s Ratio Perm         | 0.03 |      |       | 0.06  |       | 0.00 |
| v/c Ratio              | 0.08 | 0.47 | 0.51  | 0.09  | 0.27  | 0.01 |
| Uniform Delay, d1      | 5.0  | 6.1  | 6.2   | 2.7   | 11.3  | 10.8 |
| Progression Factor     | 1.00 | 1.00 | 1.00  | 1.00  | 1.00  | 1.00 |
| Incremental Delay, d2  | 0.2  | 1.2  | 1.6   | 0.0   | 0.2   | 0.0  |
| Delay (s)              | 5.3  | 7.3  | 7.8   | 2.8   | 11.5  | 10.8 |
| Level of Service       | A    | A    | A     | A     | B     | B    |
| Approach Delay (s)     |      | 7.1  | 6.7   |       | 11.4  |      |
| Approach LOS           |      | A    | A     |       | B     |      |

| Intersection Summary              |  |       |                      |      |
|-----------------------------------|--|-------|----------------------|------|
| HCM Average Control Delay         |  | 7.3   | HCM Level of Service | A    |
| HCM Volume to Capacity ratio      |  | 0.45  |                      |      |
| Actuated Cycle Length (s)         |  | 30.1  | Sum of lost time (s) | 12.5 |
| Intersection Capacity Utilization |  | 37.0% | ICU Level of Service | A    |
| Analysis Period (min)             |  | 15    |                      |      |
| c Critical Lane Group             |  |       |                      |      |