

# Old Ivy Residences

## Traffic Impact Analysis Albemarle County, Virginia

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Prepared For:

Greystar Real Estate Partners

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## TABLE OF CONTENTS

|                                                               |            |
|---------------------------------------------------------------|------------|
| <b>TABLE OF CONTENTS.....</b>                                 | <b>I</b>   |
| <b>APPENDICES .....</b>                                       | <b>II</b>  |
| <b>LIST OF TABLES.....</b>                                    | <b>III</b> |
| <b>LIST OF FIGURES .....</b>                                  | <b>IV</b>  |
| <b>1 EXECUTIVE SUMMARY .....</b>                              | <b>1-1</b> |
| 1.1 PROJECT OVERVIEW .....                                    | 1-1        |
| 1.2 PROJECT SCOPE.....                                        | 1-2        |
| 1.3 STUDY FINDINGS .....                                      | 1-3        |
| 1.4 RECOMMENDATIONS .....                                     | 1-4        |
| <b>2 ANALYSIS OF EXISTING CONDITIONS.....</b>                 | <b>2-1</b> |
| 2.1 CAPACITY ANALYSES .....                                   | 2-1        |
| 2.2 EXISTING CONDITIONS .....                                 | 2-3        |
| 2.3 2021 EXISTING CONDITIONS ANALYSIS.....                    | 2-4        |
| <b>3 ANALYSIS OF BACKGROUND CONDITIONS.....</b>               | <b>3-1</b> |
| 3.1 2025 BACKGROUND TRAFFIC GROWTH.....                       | 3-1        |
| 3.2 2025 BACKGROUND CONDITIONS ANALYSIS .....                 | 3-1        |
| <b>4 SITE TRIP GENERATION AND DISTRIBUTION .....</b>          | <b>4-1</b> |
| 4.1 TRIP GENERATION.....                                      | 4-1        |
| 4.2 SITE TRIP DISTRIBUTION.....                               | 4-1        |
| 4.3 SITE TRIP ASSIGNMENT .....                                | 4-1        |
| <b>5 ANALYSIS OF FUTURE CONDITIONS WITH DEVELOPMENT .....</b> | <b>5-1</b> |
| 5.1 2025 TOTAL TRAFFIC VOLUMES .....                          | 5-1        |
| 5.2 2025 FUTURE CONDITIONS ANALYSIS.....                      | 5-1        |
| 5.3 YEAR-TO-YEAR ANALYSIS COMPARISON .....                    | 5-3        |
| <b>6 TURN LANE WARRANT ANALYSIS .....</b>                     | <b>6-1</b> |
| 6.1 2025 FUTURE CONDITIONS ANALYSIS.....                      | 6-1        |
| <b>7 CONCLUSIONS AND RECOMMENDATIONS .....</b>                | <b>7-1</b> |
| 7.1 STUDY FINDINGS .....                                      | 7-1        |
| 7.2 RECOMMENDATIONS .....                                     | 7-2        |

## **APPENDICES**

Appendix A – Traffic Counts

Appendix B – Synchro Analysis for 2021 Existing Conditions

Appendix C – Synchro Analysis for 2025 Background Conditions

Appendix D – Synchro Analysis for 2025 Total Future Conditions

## LIST OF TABLES

|                                                                                    |     |
|------------------------------------------------------------------------------------|-----|
| TABLE 1-1: TRIP GENERATION COMPARISON.....                                         | 1-1 |
| TABLE 2-1: LEVEL OF SERVICE DEFINITIONS .....                                      | 2-1 |
| TABLE 2-2: SIGNALIZED AND UNSIGNALIZED INTERSECTION LEVEL OF SERVICE CRITERIA..... | 2-2 |
| TABLE 2-3: LOS, DELAY, AND QUEUE LENGTH SUMMARY – 2021 EXISTING CONDITIONS .....   | 2-5 |
| TABLE 3-1: LOS, DELAY, AND QUEUE LENGTH SUMMARY 2025 BACKGROUND CONDITIONS.....    | 3-2 |
| TABLE 4-1: TRIP GENERATION SUMMARY .....                                           | 4-1 |
| TABLE 5-1: LOS, DELAY, AND QUEUE LENGTH SUMMARY 2025 FUTURE CONDITIONS .....       | 5-2 |
| TABLE 5-2: LOS, DELAY, AND QUEUE LENGTH SUMMARY 2025 FUTURE CONDITIONS .....       | 5-4 |

## LIST OF FIGURES

FIGURE 1-1: VICINITY MAP

FIGURE 1-2: CONCEPTUAL PLAN

FIGURE 1-3: STUDY INTERSECTIONS

FIGURE 2-1: 2021 EXISTING VOLUMES

FIGURE 2-2: 2021 ADJUSTED EXISTING VOLUMES

FIGURE 2-3: EXISTING GEOMETRY

FIGURE 3-1: 2025 BACKGROUND VOLUMES

FIGURE 4-1: GLOBAL TRIP DISTRIBUTION

FIGURE 4-2: TRIP DISTRIBUTION

FIGURE 4-3: GENERATED TRIPS

FIGURE 5-1: 2025 FUTURE VOLUMES

FIGURE 5-2: FUTURE GEOMETRY

FIGURE 6-1: 2025 FUTURE VOLUMES – AM PEAK, LEFT TURN WARRANT EB OLD IVY ROAD AT PROPOSED SITE ENTRANCE

FIGURE 6-2: 2025 FUTURE VOLUMES – PM PEAK, LEFT TURN WARRANT EB OLD IVY ROAD AT PROPOSED SITE ENTRANCE

FIGURE 6-3: 2025 FUTURE VOLUMES, RIGHT TURN WARRANT WB OLD IVY ROAD AT PROPOSED SITE ENTRANCE

## 1 EXECUTIVE SUMMARY

This report presents the findings of the traffic impact analysis (TIA) prepared for the proposed Old Ivy Residences residential development in Albemarle County, Virginia. The TIA has been prepared in accordance with the procedures outlined in the Virginia Department of Transportation's (VDOT) Traffic Impact Analysis Regulations and the *Traffic Operations and Safety Analysis Manual, version 2.0 (TOSAM)*.

A scoping meeting with Albemarle County, the City of Charlottesville, and VDOT was held on April 29, 2021, to determine the scope of the TIA. It was determined that, based on the size of the proposed development, a VDOT Chapter 527 TIA was not required. However, Albemarle County requested the completion of a TIA to determine the impacts of the proposed site entrance and the surrounding roadway network to the site entrance.

### 1.1 PROJECT OVERVIEW

The proposed development is located north of Old Ivy Road, south of Leonard Sandridge Parkway, east of US Route 29/Route 250, and west of Harvest Drive as shown in Figure 1-1 (all figures are located at the end of their respective chapter).

The proposed development will consist of 80 single family detached homes, 60 single family detached duets, 335 units of multi-family housing, and 50 units of multifamily housing townhomes; this is the maximum development allowed under zoning. Access to the site will be provided via one (1) entrance on Old Ivy Road. The conceptual site plan can be found in Figure 1-2.

When complete, the proposed development will generate a total of 4,326 average daily trips, 284 AM peak hour trips (67 in and 217 out), and 349 PM peak hour trips (220 in and 129 out), as shown in Table 1-1.

**Table 1-1: Trip Generation Comparison**

| LAND USE                                     | ITE CODE | AMOUNT | UNITS          | WEEKDAY |              |     |       |              |     |       |
|----------------------------------------------|----------|--------|----------------|---------|--------------|-----|-------|--------------|-----|-------|
|                                              |          |        |                | ADT     | AM PEAK HOUR |     |       | PM PEAK HOUR |     |       |
|                                              |          |        |                |         | IN           | OUT | TOTAL | IN           | OUT | TOTAL |
|                                              |          |        |                |         |              |     |       |              |     |       |
| Single-Family Detached Housing               | 210      | 80     | Dwelling Units | 847     | 15           | 47  | 62    | 52           | 30  | 82    |
| Single-Family Detached Housing - Duets       | 210      | 60     | Dwelling Units | 650     | 12           | 35  | 47    | 39           | 23  | 62    |
| Multi-Family Housing (Low-Rise) - Apartments | 220      | 335    | Dwelling Units | 2,492   | 35           | 116 | 150   | 109          | 64  | 173   |
| Multi-Family Housing (Low-Rise) - Townhomes  | 220      | 50     | Dwelling Units | 337     | 6            | 19  | 25    | 20           | 12  | 32    |
|                                              |          |        |                |         |              |     |       |              |     |       |
| TOTAL                                        |          | 525    | Dwelling Units | 4,326   | 67           | 217 | 284   | 220          | 129 | 349   |

SOURCE: Institute of Transportation Engineers' *Trip Generation Manual* 10th Edition (2017)

As agreed upon during the scoping meeting with Albemarle County and VDOT, the study limits include the following existing intersections (see Figure 1-3):

1. Ivy Road and Canterbury Road/Route 846 (signalized)
2. Old Ivy Road and US Route 29/Route 250 Off-Ramp (unsignalized)
3. Old Ivy Road and Faulconer Drive (unsignalized)
4. Old Ivy Road and US Route 29/Route 250 On-Ramp (unsignalized)
5. Old Ivy Road and Ivy Road (signalized)
6. Proposed Site Entrance and Old Ivy Road (unsignalized) – 2025 Build Conditions Only

For purposes of this analysis, the development was assumed to be complete and occupied by 2025.

It is specifically noted that this study was prepared during the COVID-19 pandemic and traffic patterns and volumes were atypical. In order to accommodate for the discrepancy, a 10% adjustment factor was applied to the field counts.

Based on the 2018 VDOT STARS study for US Route 250 (Ivy Road) there are several proposed improvements regarding signal timings, median improvements, and pavement striping. As of July 2021, none of the proposed improvements had been implemented and no funding has been identified. It is not anticipated that the proposed improvements will be implemented prior to the development of the site (i.e. 2025).

## 1.2 PROJECT SCOPE

Per the scope of services, the following steps were taken to determine the potential traffic impacts associated with the proposed project:

1. Data Collection – Peak hour (7-9 AM and 4-6 PM) directional turning movement counts were performed on Thursday, May 6, 2021, at five (5) intersections within the study area. The raw data collected has been included in Appendix A.
2. Background Traffic Growth – A 1% growth rate was applied to the existing 2021 volumes to reach the background 2025 volumes.
3. Trip Generation – Traffic generated by the proposed development was estimated using the 10<sup>th</sup> edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*.
4. Traffic Distributions – The distribution of trips generated by the proposed development was based on the existing traffic volumes, the nature of the use, the surrounding roadway network, and local knowledge of traffic patterns in the area.
5. Traffic Projections – Future traffic volumes were determined using the existing traffic counts, a 1% background growth rate, and the trips generated by the proposed site.
6. Operational and Queuing Analysis – Level of service, delay, and queuing calculations were completed at the study intersections for 2021 existing, 2025 background, and 2025 future conditions using SYNCHRO Version 10 with SimTraffic. The 95<sup>th</sup> percentile queue lengths (SYNCHRO) and maximum queues (SimTraffic) were reviewed at the study intersections.

### 1.3 STUDY FINDINGS

Based on the operational analyses the following is offered:

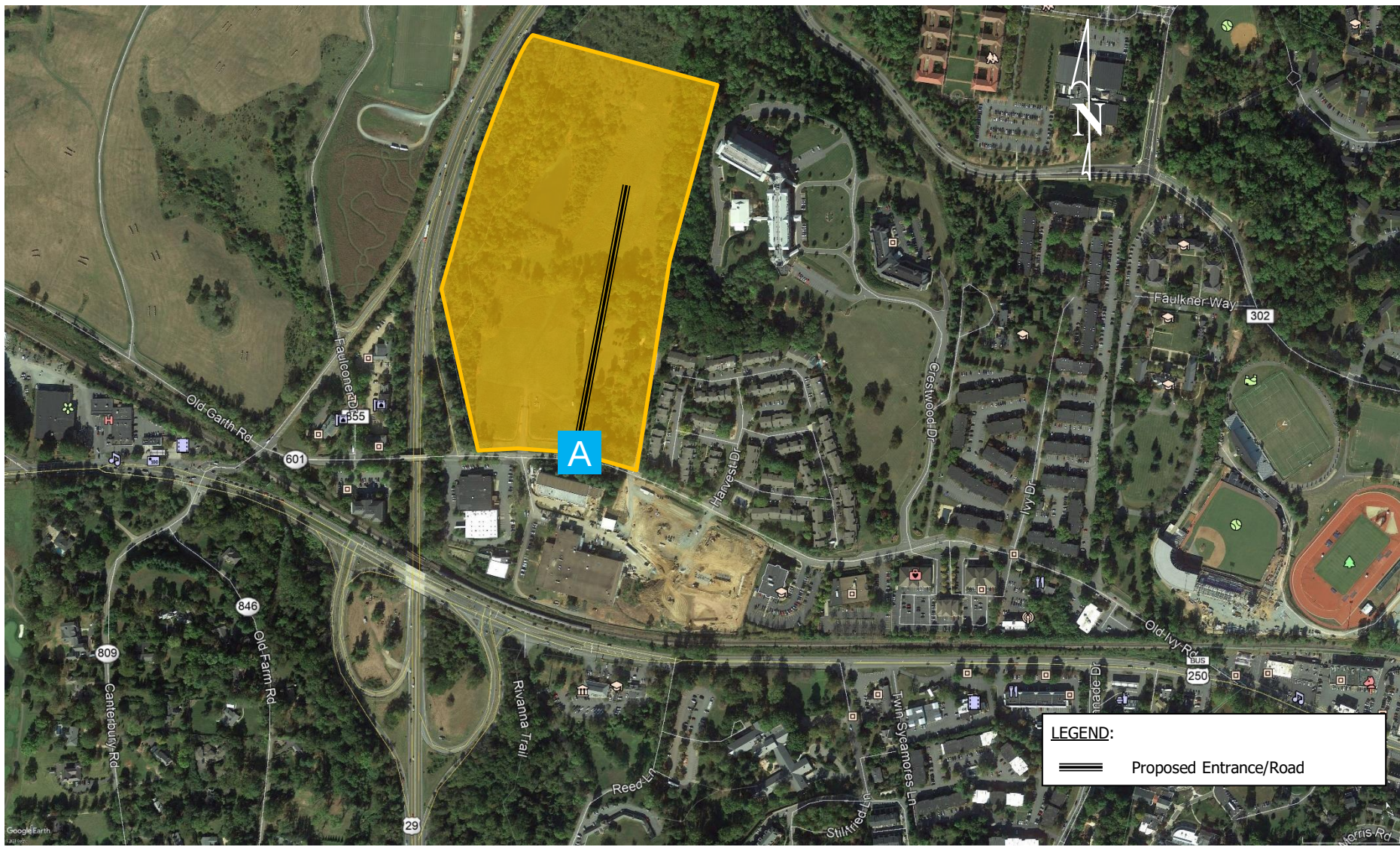
- Under the 2021 existing and 2025 background conditions:
  - The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS D in the AM and PM peaks, with queues in both mainline approaches and the southbound approach that create access issues to nearby entrances and intersections.
  - At the unsignalized intersection of Old Ivy Road and US Route 29/250 Off-Ramp, the combination of queues from the Ivy Road/Canterbury Road signal and the high volume from the US Route 29/250 Off-Ramp block access for the eastbound and westbound movements of Old Ivy Road, effectively creating a 4-way stop intersection. The US Route 29/250 Off Ramp experiences queues that extend to mainline US Route 29/250.
  - The unsignalized intersection of Old Ivy Road and Faulconer Road sees queuing issues for southbound traffic attempting to make a left onto Old Ivy Road during both peak hours. The queues at Old Ivy Road extend downstream into the US Route 29/250 Off-Ramp, which could create safety and operational issues on the ramp.
  - The unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp does not have any operational or queuing issues of note, with maximum queues of approximately 300' in the EB direction which do not interfere with other intersections or access points.
  - The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak. The only queuing issues noted are for through movement queues blocking access to nearby commercial entrances.
  - On either end of the study corridor, there are narrow railroad bridges over Old Ivy Road that severely limit the ability to widen the roadway and sometimes require vehicles to operate as if there were only a single lane. This constraint impacts the intersections of Old Ivy Road at Ivy Road, Old Ivy Road at US Route 29/250 Off-Ramp, and Ivy Road at Canterbury Road.
- Under 2025 total future conditions with the traffic from the proposed Old Ivy Road Development:
  - Overall, all existing intersections see an increase in delays and queuing with the addition of the proposed site traffic.
  - The signalized intersection of Ivy Road and Canterbury Road continues to create operational issues for the US Route 29/250 Off-Ramp, Old Ivy Road, and Faulconer Road. Without improvements to the signalized intersection or the off-ramp, operations on Old Ivy Road will not improve.
  - At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the additional site traffic does not significantly increase delays along Old Ivy Road.
  - At the signalized intersection of Old Ivy Road and Ivy Road, the increased traffic volumes do not significantly change the operations of the existing signal.
  - The proposed site entrance does not introduce any queueing or delays for mainline Old Ivy Road and the proposed turn lanes can fully accommodate the site-generated traffic.

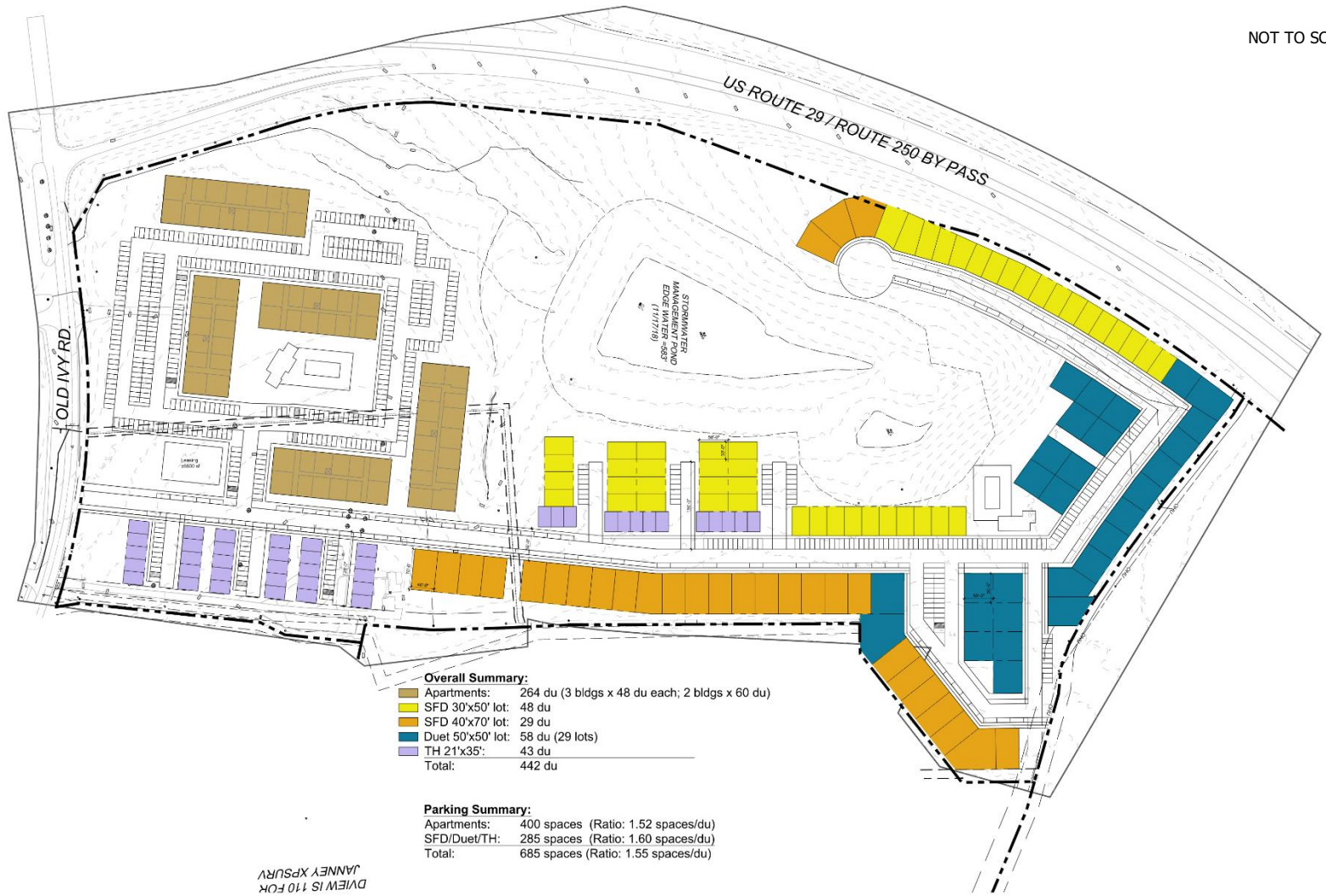
#### 1.4 RECOMMENDATIONS

In order to accommodate the increased traffic volumes associated with the proposed Old Ivy Residences residential development, the following operational and capacity improvements are recommended:

1. Install an eastbound left turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.
2. Install a westbound right turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.
3. Install a westbound right turn lane on Old Ivy Road at the US Route 29/250 on-ramp.

All recommended improvements are on Old Ivy Road across the frontage of property controlled by the development of Old Ivy Residences. The proposed improvements are expected to be constructable within existing right-of-way and along the development frontage.





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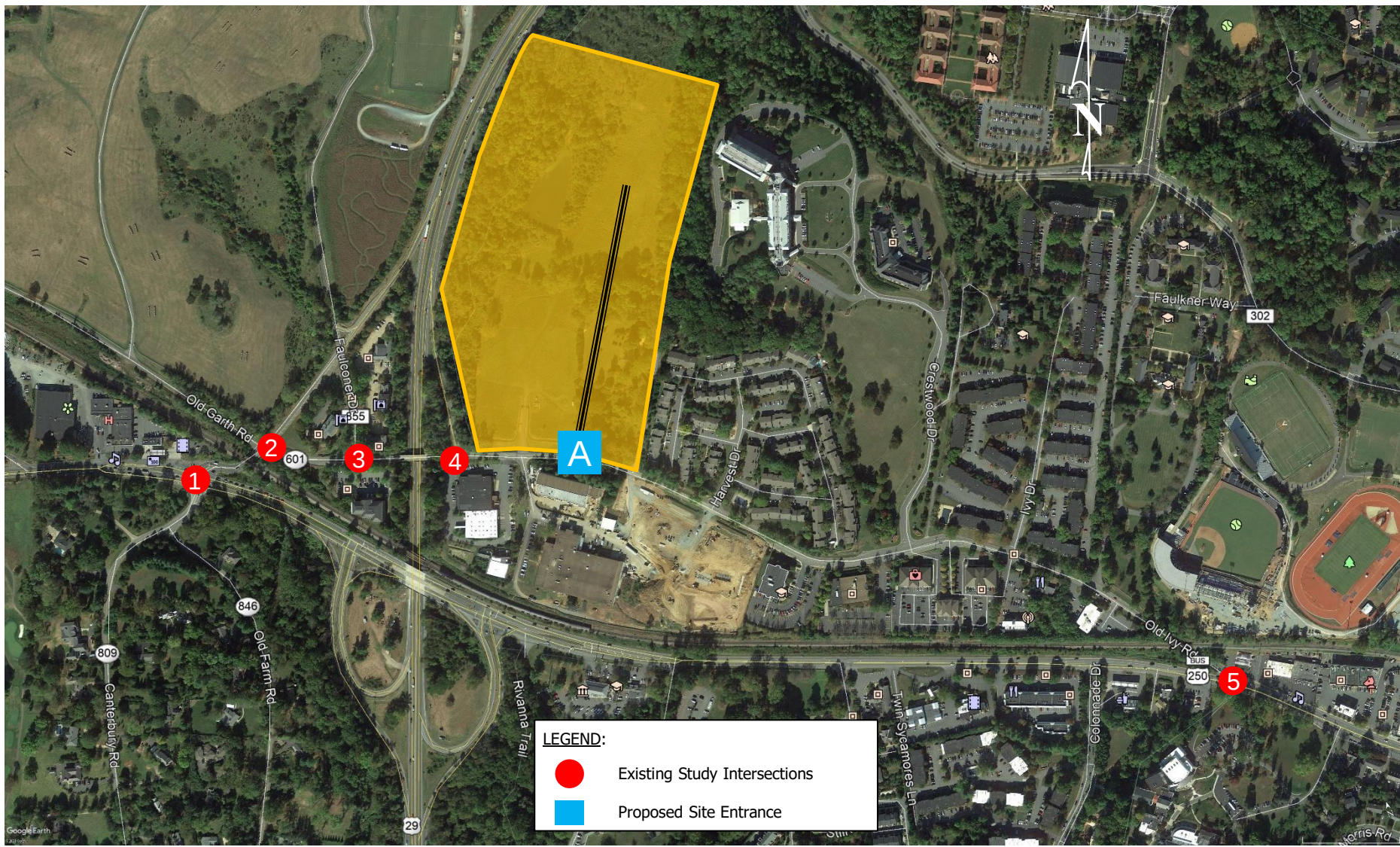
GREYSTAR

OLD IVY ROAD  
CHARLOTTESVILLE, VA # 20200-0774

CONCEPTUAL PLANNING  
JANUARY 13, 2021



SITE STUDY: APTS REVISED  
(FOR INTERNAL USE ONLY)



NOT TO  
SCALE

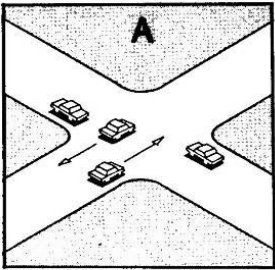
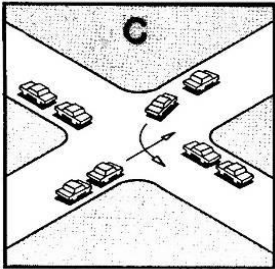
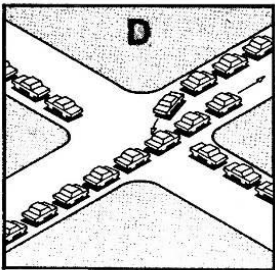
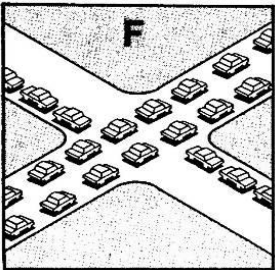
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## 2 ANALYSIS OF EXISTING CONDITIONS

### 2.1 CAPACITY ANALYSES

Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) *Highway Capacity Manual* (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. Table 2-1 shows in detail how each of these levels of service are interpreted.

**Table 2-1: Level of Service Definitions**

| Level of Service | Roadway Segments or Controlled Access Highways                                                                                                                         | Intersections                                                                                                                                                                                                                               |                                                                                       |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| A                | Free flow, low traffic density.                                                                                                                                        | No vehicle waits longer than one signal indication.                                                                                                                                                                                         |    |
| B                | Delay is not unreasonable, stable traffic flow.                                                                                                                        | On a rare occasion motorists wait through more than one signal indication.                                                                                                                                                                  |   |
| C                | Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.                                                            | Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.                                                           |  |
| D                | Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups. | Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups. |  |
| E                | Actual capacity of the roadway involves delay to all motorists due to congestion.                                                                                      | Very long queues may create lengthy delays, especially for left-turning vehicles.                                                                                                                                                           |                                                                                       |
| F                | Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.                                         | Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage area during part or all of an hour.                                                                                           |                                                                                       |

SOURCE: "A Policy on Design of Design of Urban Highways and Arterial Streets" - AASHTO, 1973 based upon material published in "Highway Capacity Manual", National Academy of Sciences, 1965.

For signalized and unsignalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. Table 2-2 summarizes the delay associated with each LOS category:

**Table 2-2: Signalized and Unsignalized Intersection Level of Service Criteria**

| Signalized Intersections |                                     | Unsignalized Intersections |                                 |
|--------------------------|-------------------------------------|----------------------------|---------------------------------|
| Level of Service         | Control Delay per Vehicle (sec/veh) | Level of Service           | Average Control Delay (sec/veh) |
| A                        | $\leq 10$                           | A                          | 0 to 10                         |
| B                        | $> 10$ to $\leq 20$                 | B                          | $> 10$ to $\leq 15$             |
| C                        | $> 20$ to $\leq 35$                 | C                          | $> 15$ to $\leq 25$             |
| D                        | $> 35$ to $\leq 55$                 | D                          | $> 25$ to $\leq 35$             |
| E                        | $> 55$ to $\leq 80$                 | E                          | $> 35$ to $\leq 50$             |
| F                        | $> 80$                              | F                          | $> 50$                          |

*Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"*

Generally, the standard acceptable minimum for the overall intersection is LOS D, while the standard acceptable minimum for an individual traffic movement is LOS E.

Capacity analyses were performed to assess existing (2021), background (2025), and future (2025) operational conditions. The signalized and unsignalized intersections were analyzed using SYNCHRO Version 10 based on HCM 2000 methodologies with the following assumptions:

- Level terrain;
- 12-foot lane widths;
- No parking activity or bus stops;
- Existing peak hour factor as determined by the traffic counts (by intersection) for existing scenario;
- The higher of the existing peak hour factor as determined by traffic counts (by intersection) or a peak hour factor of 0.92.
- Heavy vehicle percentage as determined by the traffic counts (by movement); and
- Traffic signals timing data provided by VDOT on May 18, 2021.

HCM 2000 methodologies were utilized for analysis as opposed to the latest HCM Sixth Edition or HCM 2010 methodologies. This selection is due to the non-standard NEMA phasing that is present at all of the signalized intersections. The HCM Sixth Edition and HCM 2010 methodologies only provide measures of effectiveness for signalized intersections following strict NEMA phasing.

Queuing analysis allows traffic engineers to identify where vehicles queues are not adequately accommodated by existing storage bays and impact adjacent travel lanes.

Queuing analyses were conducted using both the HCM 2000 methodology (as calculated by SYNCHRO) and SimTraffic simulations. The Synchro 95<sup>th</sup> percentile queue is the maximum back of queue for a particular lane within a lane group considering 95<sup>th</sup> percentile traffic volumes. The SimTraffic maximum queues are the average maximum queues after 10 runs of 60 minutes each.

Note that it is possible for the 95th percentile queue to be higher than the SimTraffic maximum queue due to the method in which each software calculates its respective value. The 95th percentile queue is based on an HCM formula while the SimTraffic maximum queue varies based on simulation results.

## 2.2 EXISTING CONDITIONS

Existing count data was obtained from directional turning movement (DTM) counts at the five (5) study intersections:

1. Ivy Road and Canterbury Road/Route 846 (signalized)
2. Old Ivy Road and US Route 29/Route 250 Off-Ramp (unsignalized)
3. Old Ivy Road and Faulconer Drive (unsignalized)
4. Old Ivy Road and US Route 29/Route 250 On-Ramp (unsignalized)
5. Old Ivy Road and Ivy Road (signalized)

The turning movement counts were collected on Thursday, May 6, 2021, between 7 – 9 AM and 4 – 6 PM. The data collection provided pedestrian counts for the entire duration and heavy vehicles by movement for the peak hours. The 2021 existing volumes are shown on Figure 2-1 (all figures located at the end of the chapter). The complete count data for the turning movement counts is provided in Appendix A.

In order to determine the common peak hour, the peak hour of each of the five study intersections were compared. The most common peak hour with the highest volumes across a majority of the intersections was selected as the overall peak hour. This method was selected to maintain balance between the study intersections. The AM peak hour was found to be 8:00 AM to 9:00 AM and the PM peak hour was found to be 4:30 PM – 5:30 PM.

It is noted that this study was prepared during the COVID-19 pandemic and traffic patterns and volumes were atypical. In order to accommodate for the discrepancy, a 10% adjustment factor was applied to the field counts. The 2021 adjusted existing volumes are shown on Figure 2-2.

The existing roadways within the study area include the following:

- Old Ivy Road is a two-lane, undivided major collector with a posted speed limit of 35 mph. According to 2019 VDOT count data, Old Ivy Road services 8,300 vehicles per day.
- Ivy Road (US Route 250) is a 2-lane, undivided Minor Arterial with a posted speed limit of 35 mph to the west of the US Route 29 interchange and classified as an Other Principal Arterial to the east. According to 2019 VDOT count data, Ivy Road services 13,000 vehicles per day between Dick Woods Road and US Route 29 and 58,000 vehicles per day between US Route 29 and the Charlottesville city limits.
- Falconer Drive is a two-lane, undivided local road with a posted speed limit of 30 mph. According to 2019 VDOT count data, Falconer Drive services 1,300 vehicles per day.

The existing roadway geometry for each study intersection can be found on Figure 2-3.

Per a 2018 STARS study for Ivy Road there are several proposed improvements regarding signal timings and pavement striping. As of May of 2021, none of the proposed improvements have been implemented and it is not anticipated that they will be implemented prior to the development of the site.

Due to software limitations, to accurately model intersections with significant spillback, a three-way stop geometry was utilized for SimTraffic and the field conditions geometry was used for LOS conditions for the intersection of Old Ivy Road and US Route 29/250 Off-Ramp.

### 2.3 2021 EXISTING CONDITIONS ANALYSIS

Table 2-3 summarizes the 2021 existing intersection LOS, delay, and queues based on the 2021 adjusted existing traffic volumes shown on Figure 2-2 and the existing intersection geometry and traffic controls shown on Figure 2-3. The corresponding SYNCHRO worksheets are included in Appendix B.

Level of service calculations for the five (5) existing intersections within the study area were performed using the methodology described above. To evaluate the impacts of the traffic generated by the proposed development, analyses were completed for the AM and PM peak hours:

1. Weekday AM peak hour of the adjacent street (8:00 AM – 9:00 AM); and
2. Weekday PM peak hour of the adjacent street (4:30 PM – 5:30 PM).

The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS D in the AM with a delay of 48.2 seconds/vehicle and at LOS D in the PM peak with a delay of 45.9 seconds/vehicle. There are multiple movements that operate at LOS E and F during both peak hours. The maximum queue for the eastbound left is 394 feet in the AM peak and 554 feet in the PM peak. For the westbound through-right approach, the maximum queue in the AM peak is 629 feet and the maximum queue in the PM peak is 610 feet. The queues for the mainline through and turning movements extend beyond the existing storage length and may create operational issues with other intersections along Ivy Road. The southbound approach has queues in excess of 200 feet during both peak hours, which indicates that queues from Ivy Road are impacting Old Ivy Road on the western end.

At the unsignalized intersection of Old Ivy Road and US Route 29/250 Off-Ramp, the eastbound approach operates at LOS F in the AM peak with 87.3 seconds/vehicle of delay and LOS D in the PM peak with 27.5 seconds/vehicle delay. The westbound approach operates at LOS F in the AM and LOS E in the PM peak with a delay of 167.7 seconds/vehicle in the AM peak and 47.1 seconds/vehicle in the PM peak. Although the southbound approach operates at LOS A during both peak hours, the maximum queue is 1,160 feet in the AM peak and 1,156 feet in the PM peak due to the operations of the Ivy Road at Canterbury Road signal.

At the unsignalized intersection of Old Ivy Road and Faulconer Road, the southbound approach operates at LOS F in the AM peak and LOS C in the PM peak with a delay of 349.1 seconds/vehicle in the AM peak and 20 seconds/vehicle in the PM peak. In the AM peak, the maximum queue in the southbound direction is 325 feet and 121 feet in the PM peak. The eastbound and westbound approaches of Old Ivy Road operate at LOS A during both peak hours.

At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the mainline eastbound and westbound approaches operate at LOS A during both peak hours. The northbound approach operates at LOS A during the AM peak hour and at LOS F during the PM peak hour. However, the maximum queue on the northbound approach during either peak hour is 21 feet, or approximately 1 vehicle. There are no queuing issues at this intersection.

The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak with a delay of 13.3 seconds/vehicle in the AM peak and 13.2 seconds/vehicle in the PM peak. All movements and approaches operate at LOS C or better during both peak hours. The only queuing issues noted at this intersection are the through maneuvers blocking access to entrances along Ivy Road.

**Table 2-3: LOS, Delay, and Queue Length Summary – 2021 Existing Conditions**

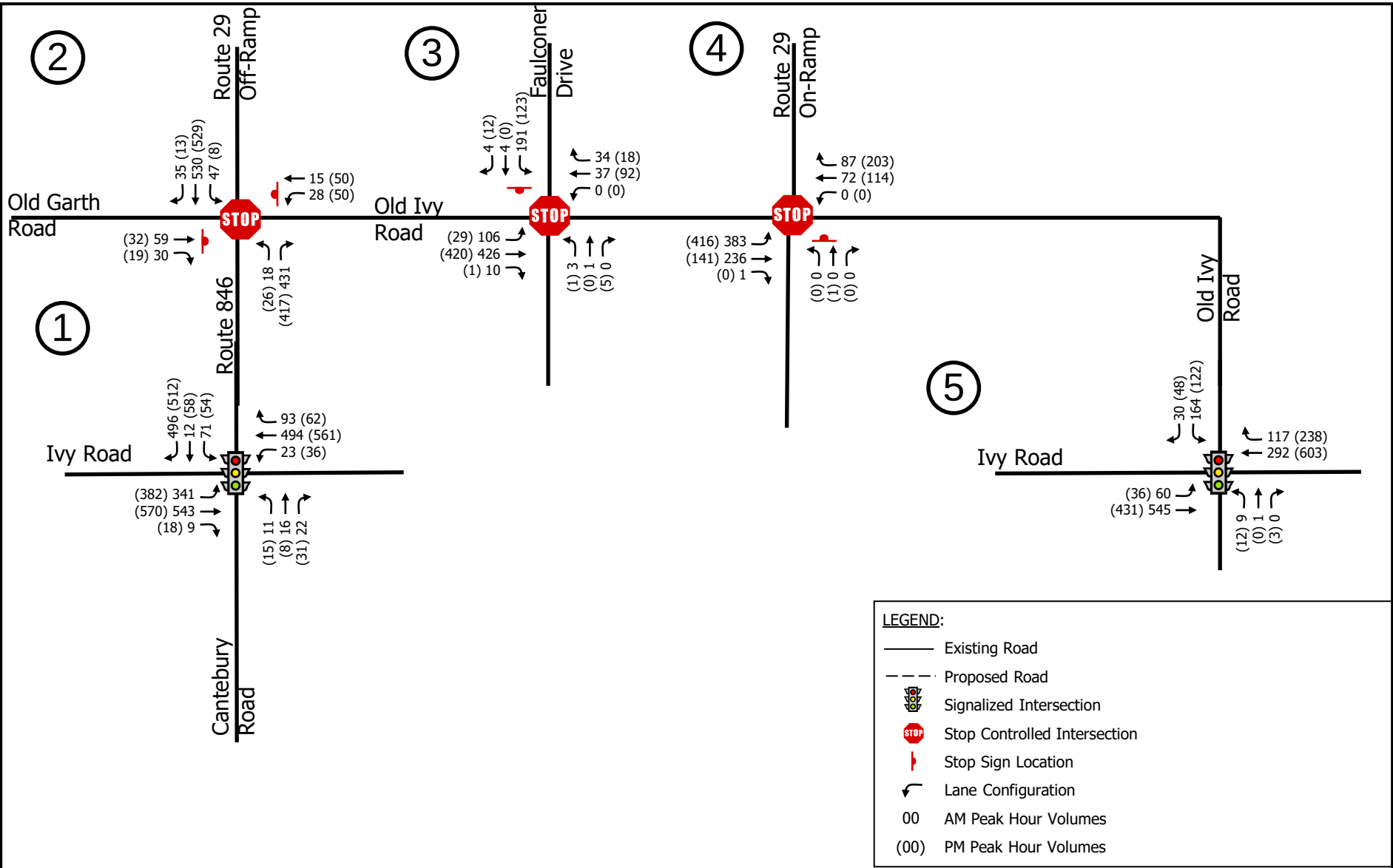
| Intersection and Type of Control                                                            | Movement and Approach | Effective Turn Lane Storage (ft) | AM PEAK HOUR                 |                  |                                           |                                      | PM PEAK HOUR                 |                  |                                           |                                      |
|---------------------------------------------------------------------------------------------|-----------------------|----------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|
|                                                                                             |                       |                                  | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) |
| 1. Ivy Road(E-W) at Canterbury Road/Route 846 (N-S)<br><i>Signalized</i>                    | EB Left               |                                  | 58.4                         | E                | #460                                      | 394                                  | 56.8                         | E                | #523                                      | 554                                  |
|                                                                                             | EB Thru               |                                  | 17.8                         | B                | 477                                       | 321                                  | 16.9                         | B                | 464                                       | 374                                  |
|                                                                                             | EB Right              | 450                              | 9.9                          | A                | 0                                         | 26                                   | 9.7                          | A                | 0                                         | 32                                   |
|                                                                                             | <i>EB Approach</i>    |                                  | 33.2                         | C                | --                                        | --                                   | 32.5                         | C                | --                                        | --                                   |
|                                                                                             | WB Left               | 200                              | 19.1                         | B                | 17                                        | 199                                  | 18.5                         | B                | 23                                        | 200                                  |
|                                                                                             | WB Thru-Right         |                                  | 64.5                         | E                | #850                                      | 629                                  | 58.4                         | E                | #821                                      | 610                                  |
|                                                                                             | <i>WB Approach</i>    |                                  | 62.8                         | E                | --                                        | --                                   | 56.2                         | E                | --                                        | --                                   |
|                                                                                             | NB Left-Thru          |                                  | 55.4                         | E                | 59                                        | 80                                   | 55.2                         | E                | 51                                        | 84                                   |
|                                                                                             | NB Right              | 180                              | 53.8                         | D                | 0                                         | 52                                   | 53.9                         | D                | 0                                         | 64                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 54.7                         | D                | --                                        | --                                   | 54.5                         | D                | --                                        | --                                   |
|                                                                                             | SB Thru-Left          |                                  | 58.9                         | E                | 132                                       | 212                                  | 67.3                         | E                | 116                                       | 214                                  |
|                                                                                             | SB Right              | 75                               | 54.7                         | D                | #440                                      | 76                                   | 53.9                         | D                | #483                                      | 75                                   |
|                                                                                             | <i>SB Approach</i>    |                                  | 55.3                         | E                | --                                        | --                                   | 55.6                         | E                | --                                        | --                                   |
|                                                                                             | <b>Overall</b>        |                                  | <b>48.2</b>                  | <b>D</b>         | <b>--</b>                                 | <b>--</b>                            | <b>45.9</b>                  | <b>D</b>         | <b>--</b>                                 | <b>--</b>                            |
| 2. Old Ivy Road (E-W) at 29 Off Ramp/Route 846 (N-S)<br><i>Unsignalized</i>                 | EB Thru-Right         |                                  | 87.3                         | F                | 123                                       | 116                                  | 27.5                         | D                | 26                                        | 93                                   |
|                                                                                             | <i>EB Approach</i>    |                                  | 87.3                         | F                | --                                        | --                                   | 27.5                         | D                | --                                        | --                                   |
|                                                                                             | WB Left-Thru          |                                  | 167.7                        | F                | 98                                        | 75                                   | 47.1                         | E                | 83                                        | 118                                  |
|                                                                                             | <i>WB Approach</i>    |                                  | 167.7                        | F                | --                                        | --                                   | 47.1                         | E                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 0.7                          | A                | 2                                         | 71                                   | 0.9                          | A                | 3                                         | 69                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 0.7                          | A                | --                                        | --                                   | 0.9                          | A                | --                                        | --                                   |
|                                                                                             | SB L-T-R              | 190                              | 1.5                          | A                | 2                                         | 1160                                 | 0.3                          | A                | 1                                         | 1156                                 |
|                                                                                             | <i>SB Approach</i>    |                                  | 1.5                          | A                | --                                        | --                                   | 0.3                          | A                | --                                        | --                                   |
| 3. Old Ivy Road (E-W) at Faulconer Road/Commercial Ent<br><i>Unsignalized</i>               | EB Left-Thru          |                                  | 2.6                          | A                | 9                                         | 111                                  | 0.7                          | A                | 2                                         | 53                                   |
|                                                                                             | EB Right              | 150                              | 0.0                          | A                | 0                                         | 0                                    | 0.0                          | A                | 0                                         | 0                                    |
|                                                                                             | <i>EB Approach</i>    |                                  | 2.6                          | A                | --                                        | --                                   | 0.7                          | A                | --                                        | --                                   |
|                                                                                             | WB L-T-R              |                                  | 0.0                          | A                | 0                                         | 0                                    | 0.0                          | A                | 0                                         | 0                                    |
|                                                                                             | <i>WB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 25.3                         | D                | 2                                         | 30                                   | 11.7                         | B                | 1                                         | 28                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 25.3                         | D                | --                                        | --                                   | 11.7                         | B                | --                                        | --                                   |
|                                                                                             | SB Left-Thru          |                                  | 349.1                        | F                | 506                                       | 325                                  | 20.0                         | C                | 45                                        | 121                                  |
| 4. Old Ivy Road (E-W) at Route 29 On-Ramp/ Commercial Entrance (N-S)<br><i>Unsignalized</i> | SB Right              | 190                              | 0.0                          | A                | 0                                         | 88                                   | 0.0                          | A                | 0                                         | 30                                   |
|                                                                                             | <i>SB Approach</i>    |                                  | 349.1                        | F                | --                                        | --                                   | 20.0                         | C                | --                                        | --                                   |
|                                                                                             | EB L-T-R              |                                  | 7.4                          | A                | 46                                        | 166                                  | 8.8                          | A                | 52                                        | 279                                  |
|                                                                                             | <i>EB Approach</i>    |                                  | 7.4                          | A                | --                                        | --                                   | 8.8                          | A                | --                                        | --                                   |
|                                                                                             | WB Left-Thru          |                                  | 0.0                          | †                | 0                                         | 0                                    | 0.0                          | †                | 0                                         | 3                                    |
|                                                                                             | WB Right              | 50                               | 0.0                          | A                | 0                                         | 44                                   | 0.0                          | A                | 0                                         | 49                                   |
| 5. Ivy Road(E-W) at Old Ivy Road (N-S)<br><i>Signalized</i>                                 | <i>WB Approach</i>    |                                  | 0.0                          | †                | --                                        | --                                   | 0.0                          | †                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 0.0                          | †                | 0                                         | 0                                    | 57.5                         | †                | 1                                         | 21                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 57.5                         | F                | --                                        | --                                   |
|                                                                                             | EB Left               | 90                               | 7.9                          | A                | 43                                        | 81                                   | 8.0                          | A                | 32                                        | 72                                   |
|                                                                                             | EB Thru               |                                  | 13.3                         | B                | #421                                      | 241                                  | 10.1                         | B                | 253                                       | 153                                  |
|                                                                                             | <i>EB Approach</i>    |                                  | 12.7                         | B                | --                                        | --                                   | 9.9                          | A                | --                                        | --                                   |
|                                                                                             | WB Thru               |                                  | 9.2                          | A                | 169                                       | 174                                  | 14.5                         | B                | #467                                      | 328                                  |
|                                                                                             | WB Right              |                                  | 7.6                          | A                | 29                                        | 66                                   | 7.5                          | A                | 39                                        | 80                                   |
|                                                                                             | <i>WB Approach</i>    |                                  | 8.8                          | A                | --                                        | --                                   | 12.5                         | B                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 32.7                         | C                | 20                                        | 39                                   | 28.5                         | C                | 0                                         | 45                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 32.7                         | C                | --                                        | --                                   | 28.5                         | C                | --                                        | --                                   |
|                                                                                             | SB L-T-R              |                                  | 23.7                         | C                | 98                                        | 178                                  | 23.8                         | C                | 82                                        | 166                                  |
|                                                                                             | <i>SB Approach</i>    |                                  | 23.7                         | C                | --                                        | --                                   | 23.8                         | C                | --                                        | --                                   |
|                                                                                             | <b>Overall</b>        |                                  | <b>13.3</b>                  | <b>B</b>         | <b>--</b>                                 | <b>--</b>                            | <b>13.2</b>                  | <b>B</b>         | <b>--</b>                                 | <b>--</b>                            |

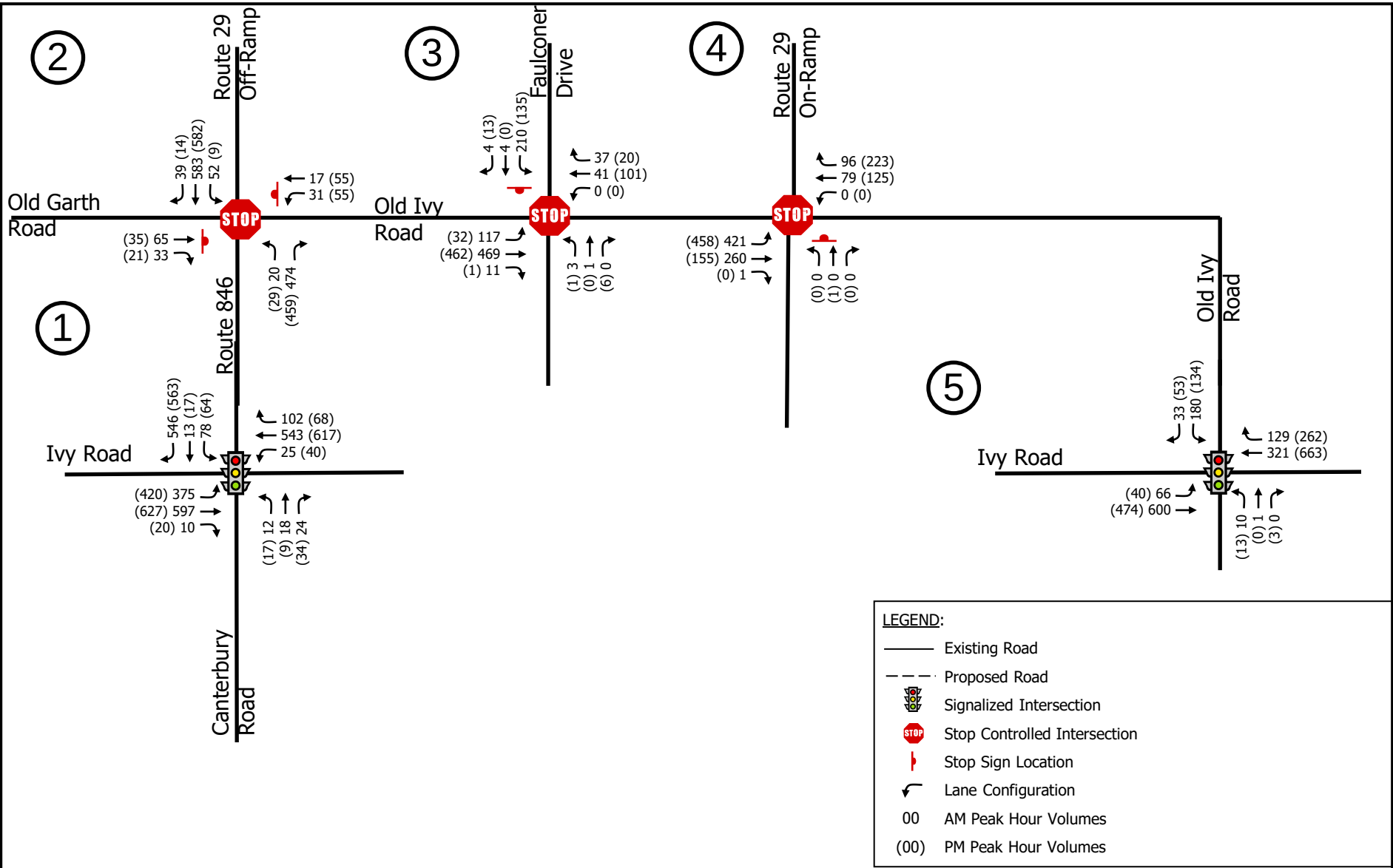
<sup>1</sup> Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

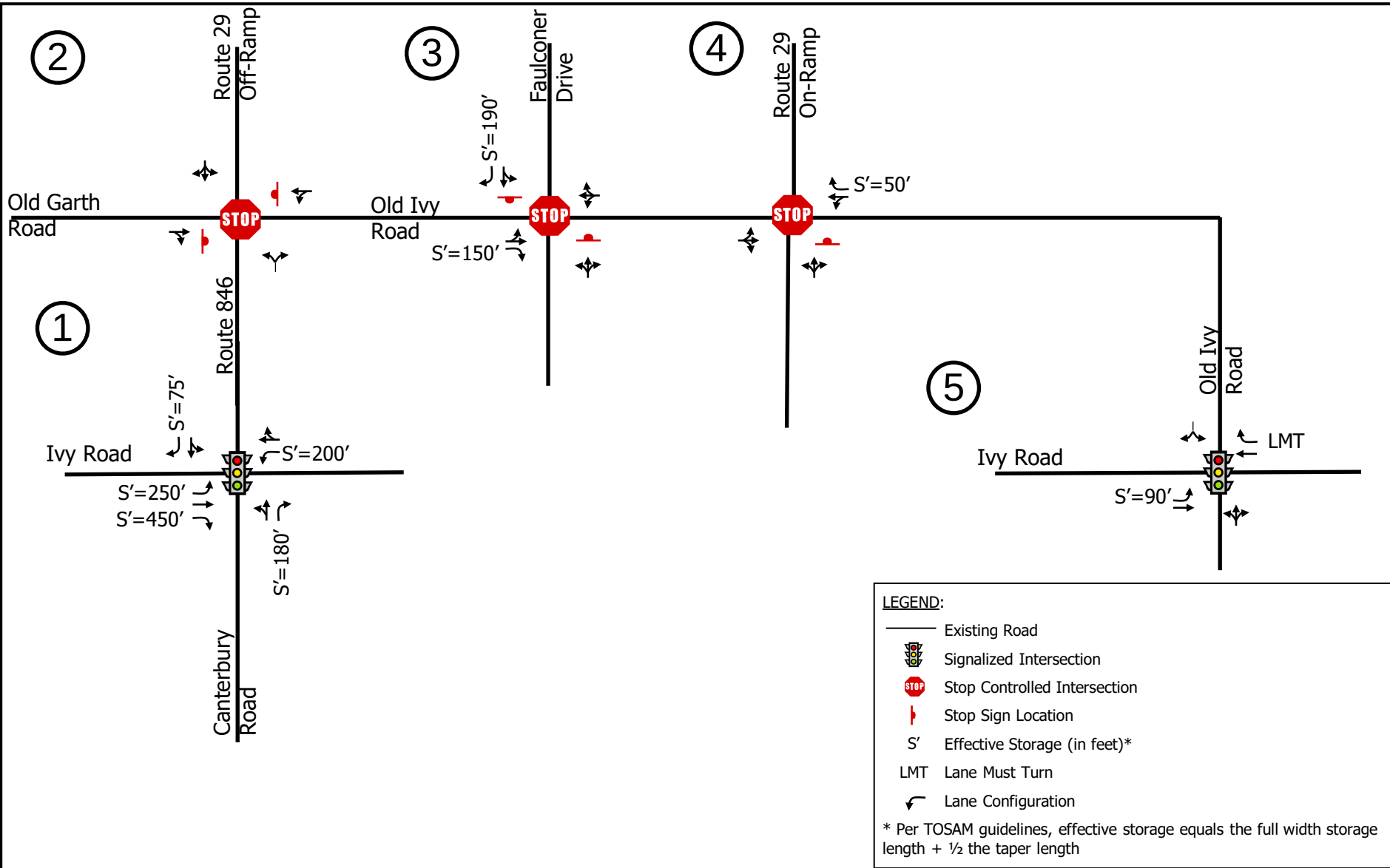
† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

# - 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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### **3 ANALYSIS OF BACKGROUND CONDITIONS**

#### **3.1 2025 BACKGROUND TRAFFIC GROWTH**

The background 2025 volumes were analyzed assuming the existing intersection geometry in conjunction with projected background traffic volumes. The background traffic volumes were developed based on a 1% annual growth rate. The growth rate was compounded annually for the 4-year period from 2021 to 2025. The resulting 2025 existing volumes plus background growth are shown on Figure 3-1.

#### **3.2 2025 BACKGROUND CONDITIONS ANALYSIS**

Table 3-1 summarizes the 2025 background intersection LOS, delay, and queues based on the 2025 background traffic volumes shown on Figure 3-1 and the existing intersection geometry and traffic controls shown on Figure 2-3. The corresponding SYNCHRO worksheets are included in Appendix C.

The signalized intersection of Ivy Road and Canterbury Road continues to operate at an overall LOS D in both peak hours with a delay of 53 seconds/vehicle in the AM peak and 54 seconds/vehicle in the PM peak. The mainline eastbound and westbound approaches operate at LOS C or worse during both peak hours with queues that are in excess of 400 feet during both peak hours. The southbound approach has queues in excess of 200 feet during both peak hours, which indicates that queues from Ivy Road are impacting Old Ivy Road on the western end.

At the unsignalized intersection of Old Ivy Road and the US Route 29/250 Off-Ramp the eastbound and westbound approaches operate at LOS F during both peak hours with queues in excess of 100 feet during both peak hours. Although the southbound approach operates at LOS A during both peak hours, the maximum queue is 1,164 feet in the AM peak and 1,147 feet in the PM peak due to the operations of the Ivy Road at Canterbury Road signal.

At the unsignalized intersection of Old Ivy Road and Faulconer Road the southbound approach operates at LOS F in the AM peak and LOS D in the PM peak with a delay of 85.7 seconds/vehicle in the AM peak and 25.1 seconds/vehicle in the PM peak. In the southbound direction the maximum queue is 138 feet in the PM peak and 232 feet in the AM peak. The eastbound and westbound approaches of Old Ivy Road operate at LOS A during both peak hours.

At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the mainline eastbound and westbound approaches operate at LOS A during both peak hours. The northbound approach operates at LOS A during the AM peak hour and at LOS F during the PM peak hour. However, the maximum queue on the northbound approach during either peak hour is 38 feet, or approximately 2 vehicles. There are no queuing issues at this intersection.

The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak hours. All movements and approaches operate at LOS C or better during both peak hours. The only queuing issues noted at this intersection are the through maneuvers blocking access to entrances along Ivy Road.

All operational and queuing issues noted in the 2021 existing conditions are found to be equal or worse under the 2025 background conditions.

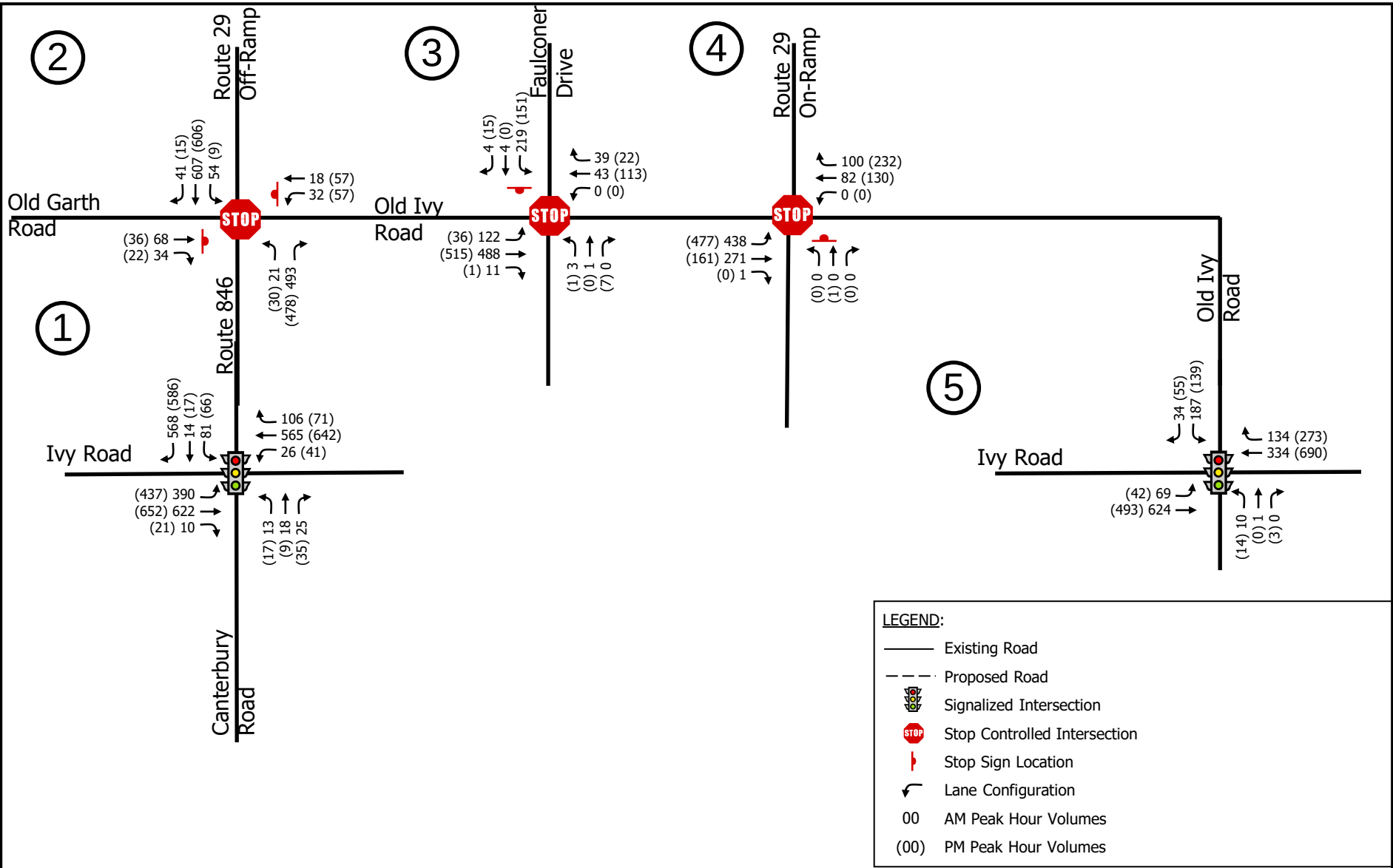
**Table 3-1: LOS, Delay, and Queue Length Summary 2025 Background Conditions**

| Intersection and Type of Control                                                            | Movement and Approach | Effective Turn Lane Storage (ft) | AM PEAK HOUR                 |                  |                                           |                                      | PM PEAK HOUR                 |                  |                                           |                                      |
|---------------------------------------------------------------------------------------------|-----------------------|----------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|
|                                                                                             |                       |                                  | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) |
| 1. Ivy Road(E-W) at Canterbury Road/Route 846 (N-S)<br><i>Signalized</i>                    | EB Left               |                                  | 56.9                         | E                | #484                                      | 456                                  | 53.8                         | D                | #550                                      | 609                                  |
|                                                                                             | EB Thru               |                                  | 18.2                         | B                | 499                                       | 420                                  | 18.8                         | B                | 493                                       | 415                                  |
|                                                                                             | EB Right              | 450                              | 9.9                          | A                | 0                                         | 29                                   | 10.4                         | B                | 0                                         | 31                                   |
|                                                                                             | <i>EB Approach</i>    |                                  | 32.9                         | C                | --                                        | --                                   | 32.4                         | C                | --                                        | --                                   |
|                                                                                             | WB Left               | 200                              | 20.0                         | B                | 18                                        | 199                                  | 20.4                         | C                | 23                                        | 200                                  |
|                                                                                             | WB Thru-Right         |                                  | 80.6                         | F                | #885                                      | 638                                  | 92.2                         | F                | #872                                      | 620                                  |
|                                                                                             | <i>WB Approach</i>    |                                  | 78.4                         | E                | --                                        | --                                   | 88.3                         | F                | --                                        | --                                   |
|                                                                                             | NB Left-Thru          |                                  | 55.4                         | E                | 60                                        | 90                                   | 55.2                         | E                | 51                                        | 82                                   |
|                                                                                             | NB Right              | 180                              | 53.8                         | D                | 0                                         | 41                                   | 53.9                         | D                | 0                                         | 66                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 54.7                         | D                | --                                        | --                                   | 54.5                         | D                | --                                        | --                                   |
|                                                                                             | SB Thru-Left          |                                  | 59.9                         | E                | 135                                       | 213                                  | 56.8                         | E                | 119                                       | 214                                  |
|                                                                                             | SB Right              | 75                               | 56.6                         | E                | #511                                      | 76                                   | 50.2                         | D                | #576                                      | 76                                   |
|                                                                                             | <i>SB Approach</i>    |                                  | 57.1                         | E                | --                                        | --                                   | 51.0                         | D                | --                                        | --                                   |
|                                                                                             | <b>Overall</b>        |                                  | <b>53.0</b>                  | <b>D</b>         | --                                        | --                                   | <b>54.0</b>                  | <b>D</b>         | --                                        | --                                   |
| 2. Old Ivy Road (E-W) at 29 Off Ramp/Route 846 (N-S)<br><i>Unsignalized</i>                 | EB Thru-Right         |                                  | 69.8                         | F                | 105                                       | 138                                  | 30.2                         | D                | 30                                        | 80                                   |
|                                                                                             | <i>EB Approach</i>    |                                  | 69.8                         | F                | --                                        | --                                   | 30.2                         | D                | --                                        | --                                   |
|                                                                                             | WB Left-Thru          |                                  | 108.1                        | F                | 77                                        | 86                                   | 58.7                         | F                | 101                                       | 141                                  |
|                                                                                             | <i>WB Approach</i>    |                                  | 108.1                        | F                | --                                        | --                                   | 58.7                         | F                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 0.7                          | A                | 2                                         | 73                                   | 0.9                          | A                | 3                                         | 71                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 0.7                          | A                | --                                        | --                                   | 0.9                          | A                | --                                        | --                                   |
|                                                                                             | SB L-T-R              | 190                              | 1.5                          | A                | 5                                         | 1164                                 | 0.3                          | A                | 1                                         | 1147                                 |
|                                                                                             | <i>SB Approach</i>    |                                  | 1.5                          | A                | --                                        | --                                   | 0.3                          | A                | --                                        | --                                   |
| 3. Old Ivy Road (E-W) at Faulconer Road/Commercial Ent<br><i>Unsignalized</i>               | EB Left-Thru          |                                  | 2.3                          | A                | 7                                         | 87                                   | 0.8                          | A                | 2                                         | 58                                   |
|                                                                                             | EB Right              | 150                              | 0.0                          | A                | 0                                         | 3                                    | 0.0                          | A                | 0                                         | 0                                    |
|                                                                                             | <i>EB Approach</i>    |                                  | 2.3                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                             | WB L-T-R              |                                  | 0.0                          | A                | 0                                         | 6                                    | 0.0                          | A                | 0                                         | 2                                    |
|                                                                                             | <i>WB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 19.4                         | C                | 1                                         | 28                                   | 12.3                         | B                | 1                                         | 28                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 19.4                         | C                | --                                        | --                                   | 12.3                         | B                | --                                        | --                                   |
|                                                                                             | SB Left-Thru          |                                  | 85.7                         | F                | 221                                       | 232                                  | 25.1                         | D                | 65                                        | 138                                  |
|                                                                                             | SB Right              | 190                              | 0.0                          | A                | 0                                         | 46                                   | 0.0                          | A                | 0                                         | 47                                   |
|                                                                                             | <i>SB Approach</i>    |                                  | 85.7                         | F                | --                                        | --                                   | 25.1                         | D                | --                                        | --                                   |
| 4. Old Ivy Road (E-W) at Route 29 On-Ramp/ Commercial Entrance (N-S)<br><i>Unsignalized</i> | EB L-T-R              |                                  | 7.0                          | A                | 39                                        | 160                                  | 9.1                          | A                | 57                                        | 310                                  |
|                                                                                             | <i>EB Approach</i>    |                                  | 7.0                          | A                | --                                        | --                                   | 9.1                          | A                | --                                        | --                                   |
|                                                                                             | WB Left-Thru          |                                  | 0.0                          | A                | 0                                         | 0                                    | 0.0                          | †                | 0                                         | 5                                    |
|                                                                                             | WB Right              | 50                               | 0.0                          | A                | 0                                         | 0                                    | 0.0                          | A                | 0                                         | 44                                   |
|                                                                                             | <i>WB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | †                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 0.0                          | A                | 0                                         | 38                                   | 64.8                         | †                | 1                                         | 17                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 64.8                         | F                | --                                        | --                                   |
| 5. Ivy Road(E-W) at Old Ivy Road (N-S)<br><i>Signalized</i>                                 | EB Left               | 90                               | 7.9                          | A                | 46                                        | 89                                   | 8.3                          | A                | 34                                        | 78                                   |
|                                                                                             | EB Thru               |                                  | 13.7                         | B                | #452                                      | 254                                  | 10.3                         | B                | 260                                       | 190                                  |
|                                                                                             | <i>EB Approach</i>    |                                  | 13.1                         | B                | --                                        | --                                   | 10.2                         | B                | --                                        | --                                   |
|                                                                                             | WB Thru               |                                  | 9.2                          | A                | 178                                       | 158                                  | 15.1                         | B                | #481                                      | 322                                  |
|                                                                                             | WB Right              |                                  | 7.6                          | A                | 29                                        | 77                                   | 7.7                          | A                | 41                                        | 92                                   |
|                                                                                             | <i>WB Approach</i>    |                                  | 8.8                          | A                | --                                        | --                                   | 13.0                         | B                | --                                        | --                                   |
|                                                                                             | NB L-T-R              |                                  | 33.9                         | C                | 20                                        | 50                                   | 28.6                         | C                | 0                                         | 49                                   |
|                                                                                             | <i>NB Approach</i>    |                                  | 33.9                         | C                | --                                        | --                                   | 28.6                         | C                | --                                        | --                                   |
|                                                                                             | SB L-T-R              |                                  | 24.5                         | C                | 103                                       | 185                                  | 23.8                         | C                | 83                                        | 160                                  |
|                                                                                             | <i>SB Approach</i>    |                                  | 24.5                         | C                | --                                        | --                                   | 23.8                         | C                | --                                        | --                                   |
|                                                                                             | <b>Overall</b>        |                                  | <b>13.6</b>                  | <b>B</b>         | --                                        | --                                   | <b>13.5</b>                  | <b>B</b>         | --                                        | --                                   |

<sup>1</sup> Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

# - 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.



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## 4 SITE TRIP GENERATION AND DISTRIBUTION

### 4.1 TRIP GENERATION

The site-generated traffic volumes shown in Table 4-1 were estimated using the 10<sup>th</sup> edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* and were calculated using the number of dwelling units as the independent variable.

**Table 4-1: Trip Generation Summary**

| LAND USE                                     | ITE CODE | AMOUNT     | UNITS                 | WEEKDAY      |              |            |            |              |            |            |
|----------------------------------------------|----------|------------|-----------------------|--------------|--------------|------------|------------|--------------|------------|------------|
|                                              |          |            |                       | ADT          | AM PEAK HOUR |            |            | PM PEAK HOUR |            |            |
|                                              |          |            |                       |              | IN           | OUT        | TOTAL      | IN           | OUT        | TOTAL      |
| Single-Family Detached Housing               | 210      | 80         | Dwelling Units        | 847          | 15           | 47         | 62         | 52           | 30         | 82         |
| Single-Family Detached Housing - Duets       | 210      | 60         | Dwelling Units        | 650          | 12           | 35         | 47         | 39           | 23         | 62         |
| Multi-Family Housing (Low-Rise) - Apartments | 220      | 335        | Dwelling Units        | 2,492        | 35           | 116        | 150        | 109          | 64         | 173        |
| Multi-Family Housing (Low-Rise) - Townhomes  | 220      | 50         | Dwelling Units        | 337          | 6            | 19         | 25         | 20           | 12         | 32         |
| <b>TOTAL</b>                                 |          | <b>525</b> | <b>Dwelling Units</b> | <b>4,326</b> | <b>67</b>    | <b>217</b> | <b>284</b> | <b>220</b>   | <b>129</b> | <b>349</b> |

SOURCE: Institute of Transportation Engineers' *Trip Generation Manual* 10th Edition (2017)

When complete, the proposed development will generate a total of 4,326 average daily trips, 284 AM peak hour trips (67 in and 217 out), and 349 PM peak Hour trips (220 in and 129 out), as shown in Table 4-1.

### 4.2 SITE TRIP DISTRIBUTION

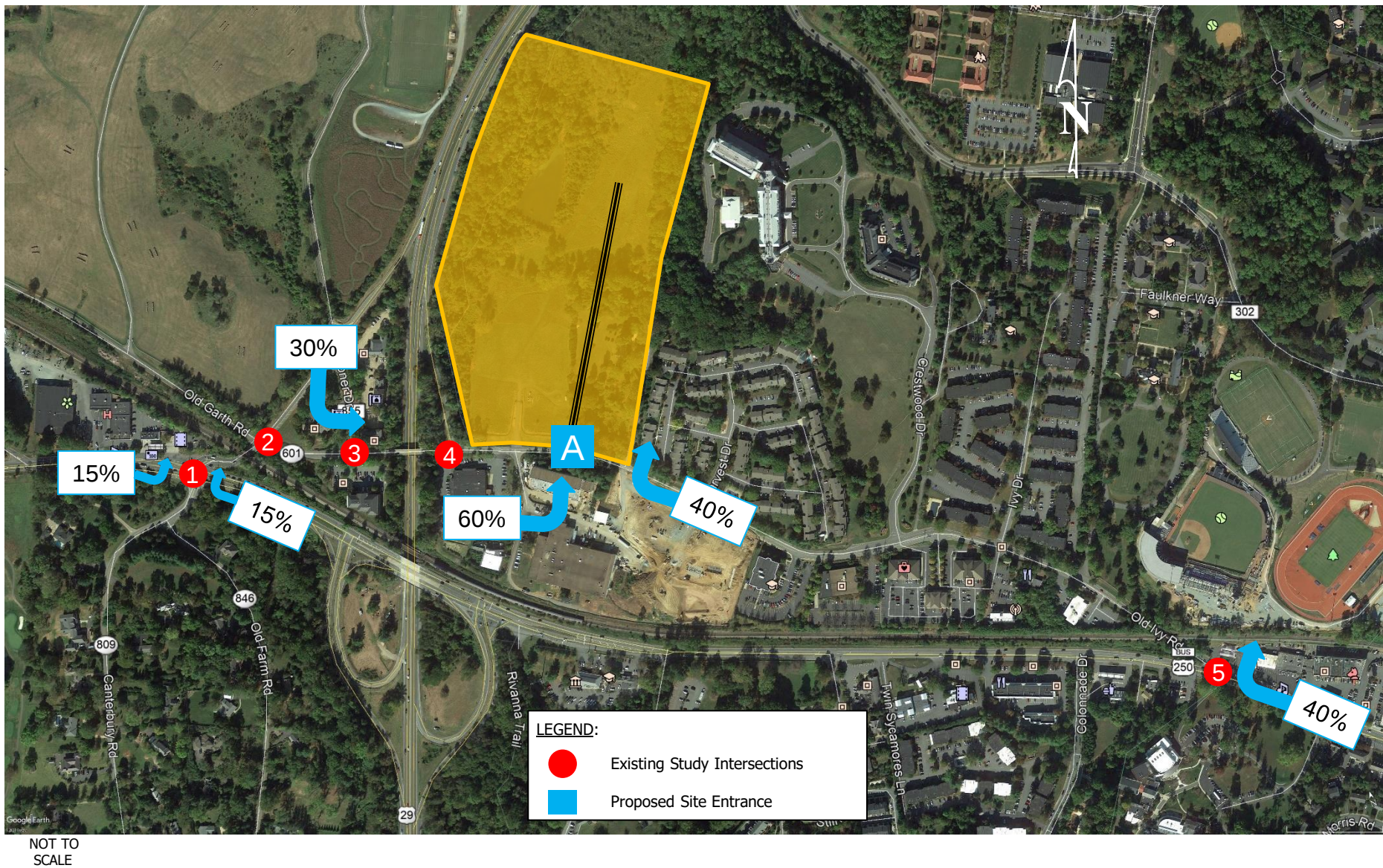
The distribution of site trips generated by the proposed residential development was based on the existing traffic volumes, the nature of the use, the surrounding roadway network, and local knowledge of traffic patterns in the area.

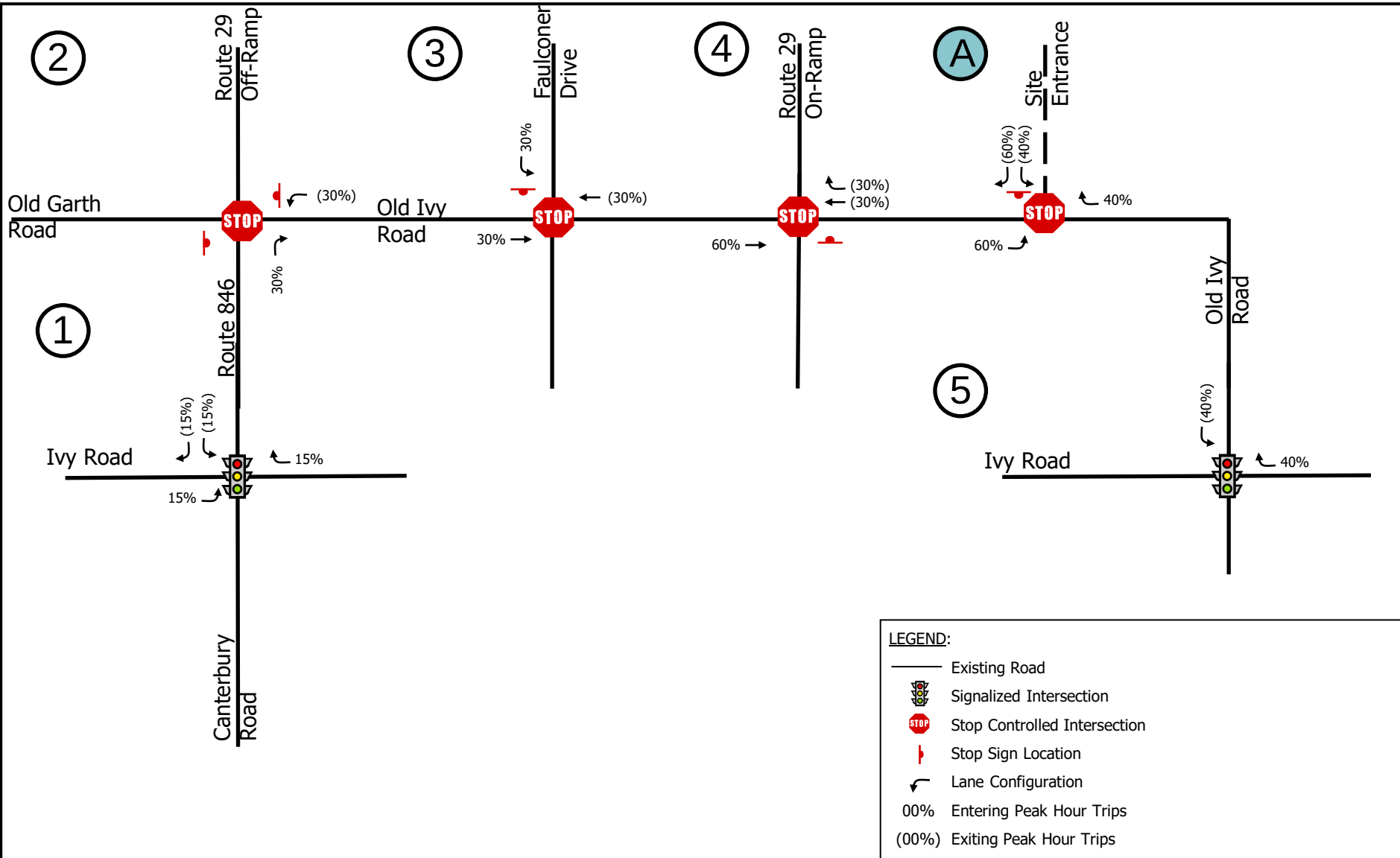
The global trip distributions are shown on Figure 4-1 and the proposed trip distributions by study intersection are shown on Figure 4-2.

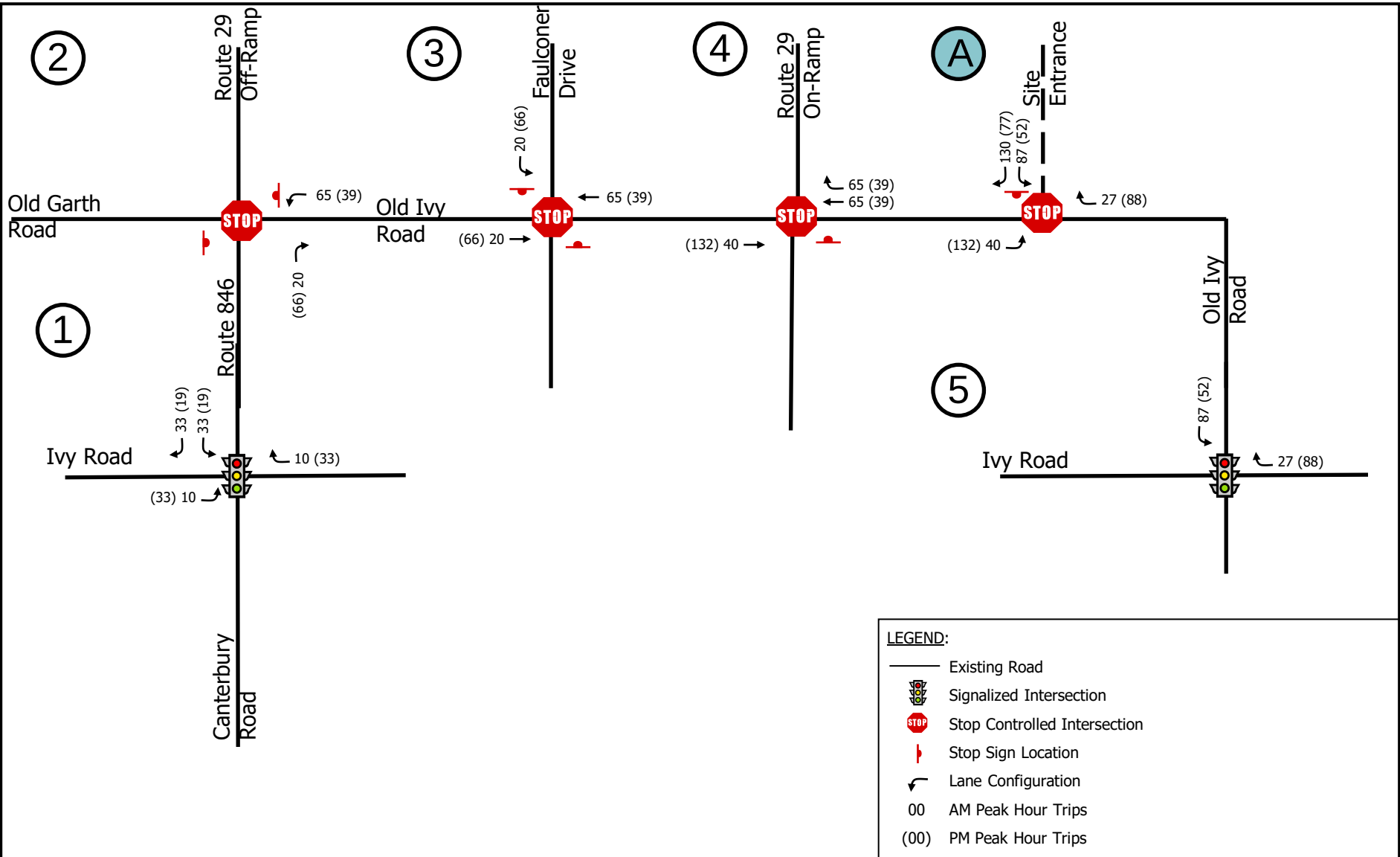
### 4.3 SITE TRIP ASSIGNMENT

The trip distribution percentages for the site trips were applied to the trip generation volumes shown in Table 4-1 to calculate the site trips for the surrounding roadway network. The resulting site generated trips are shown on Figure 4-3.

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## **5 ANALYSIS OF FUTURE CONDITIONS WITH DEVELOPMENT**

### **5.1 2025 TOTAL TRAFFIC VOLUMES**

To complete the analysis of the 2025 future conditions (with the proposed development), the estimated site trips were added to the background 2025 volumes. The projected total future (background + site) volumes were then used to complete the capacity analysis.

To generate the 2025 total future traffic volumes, the site trips shown on Figure 4-1 and the background 2025 traffic volumes shown in Figure 3-1 were combined. The resulting 2025 total future traffic volumes are shown in Figure 5-1.

### **5.2 2025 FUTURE CONDITIONS ANALYSIS**

Table 5-1 summarizes the 2025 future intersection LOS, delay, and queues based on the 2025 future traffic volumes shown on Figure 5-1 and the future intersection geometry and traffic controls shown on Figure 5-2. The corresponding SYNCHRO worksheets are included in Appendix D.

The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS E in both peak hours. The mainline eastbound and westbound approaches operate at LOS C or worse during both peak hours with queues that are in excess of 300 feet during the AM peak hour and 500 feet during the PM peak hour. The southbound approach has queues in excess of 200 feet during both peak hours, which indicates that queues from Ivy Road are impacting Old Ivy Road on the western end.

At the unsignalized intersection of Old Ivy Road and the US Route 29/250 Off-Ramp, the eastbound and westbound approaches continue to operate at LOS F during both peak hours with queues in excess of 100 feet during both peak hours. Although the southbound approach operates at LOS A during both peak hours, the maximum queue is 1,163 feet in the AM peak and 1,150 feet in the PM peak due to the operations of the Ivy Road at Canterbury Road signal.

At the unsignalized intersection of Old Ivy Road and Faulconer Road, the southbound approach operates at LOS F in the AM and PM peaks. In the southbound direction the maximum queue is 280 feet in the AM peak and 218 feet in the PM peak. The eastbound and westbound approaches of Old Ivy Road operate at LOS A during both peak hours.

At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the mainline eastbound and westbound approaches operate at LOS A during both peak hours. The northbound approach operates at LOS A during the AM peak hour and at LOS F during the PM peak hour. However, the maximum queue on the northbound approach during either peak hour is 44 feet, or approximately 2 vehicles. There are no queuing issues at this intersection.

The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak hours. All movements and approaches operate at LOS C or better during both peak hours. The through maneuver queues will continue to block access to entrances along Ivy Road.

At the proposed site entrance, the southbound approach operates at a LOS B in the AM peak and LOS C in the PM peak. In the eastbound direction, there is a maximum queue of 40 feet in the AM peak and 70 feet in the PM peak. The mainline movements along Old Ivy Road at the proposed site entrance are not adversely impacted by the introduction of the site traffic and the queues will not impact through traffic.

**Table 5-1: LOS, Delay, and Queue Length Summary 2025 Future Conditions**

| Intersection and Type of Control                                                           | Movement and Approach | Effective Turn Lane Storage (ft) | AM PEAK HOUR                 |                  |                                           |                                      | PM PEAK HOUR                 |                  |                                           |                                      |
|--------------------------------------------------------------------------------------------|-----------------------|----------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|------------------------------|------------------|-------------------------------------------|--------------------------------------|
|                                                                                            |                       |                                  | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) | Delay <sup>1</sup> (sec/veh) | LOS <sup>1</sup> | SYNCHRO 95th Percentile Queue Length (ft) | SimTraffic Maximum Queue Length (ft) |
| 1. Ivy Road (E-W) at Canterbury Road/Route 846 (N-S)<br><i>Signalized</i>                  | EB Left               |                                  | 52.1                         | D                | #498                                      | 525                                  | 71.6                         | E                | #611                                      | 674                                  |
|                                                                                            | EB Thru               |                                  | 18.8                         | B                | 499                                       | 404                                  | 19.0                         | B                | 493                                       | 446                                  |
|                                                                                            | EB Right              | 450                              | 10.2                         | B                | 0                                         | 28                                   | 10.5                         | B                | 0                                         | 29                                   |
|                                                                                            | <i>EB Approach</i>    |                                  | 31.6                         | C                | --                                        | --                                   | 40.5                         | D                | --                                        | --                                   |
|                                                                                            | WB Left               | 200                              | 22.1                         | C                | 18                                        | 199                                  | 20.9                         | C                | 23                                        | 200                                  |
|                                                                                            | WB Thru-Right         |                                  | 112.1                        | F                | #904                                      | 638                                  | 113.7                        | F                | #930                                      | 629                                  |
|                                                                                            | <i>WB Approach</i>    |                                  | 108.8                        | F                | --                                        | --                                   | 108.9                        | F                | --                                        | --                                   |
|                                                                                            | NB Left-Thru          |                                  | 55.4                         | E                | 60                                        | 68                                   | 55.2                         | E                | 51                                        | 74                                   |
|                                                                                            | NB Right              | 180                              | 53.8                         | D                | 0                                         | 43                                   | 53.9                         | D                | 0                                         | 55                                   |
|                                                                                            | <i>NB Approach</i>    |                                  | 54.7                         | D                | --                                        | --                                   | 54.5                         | D                | --                                        | --                                   |
|                                                                                            | SB Thru-Left          |                                  | 71.4                         | E                | #196                                      | 213                                  | 61.7                         | E                | 141                                       | 212                                  |
|                                                                                            | SB Right              | 75                               | 56.9                         | E                | #651                                      | 75                                   | 54.5                         | D                | #653                                      | 76                                   |
|                                                                                            | <i>SB Approach</i>    |                                  | 59.5                         | E                | --                                        | --                                   | 55.6                         | E                | --                                        | --                                   |
|                                                                                            | <b>Overall</b>        |                                  | <b>61.8</b>                  | <b>E</b>         | <b>--</b>                                 | <b>--</b>                            | <b>64.7</b>                  | <b>E</b>         | <b>--</b>                                 | <b>--</b>                            |
| 2. Old Ivy Road (E-W) at 29 Off Ramp/Route 846 (N-S)<br><i>Unsignalized</i>                | EB Thru-Right         |                                  | 75.7                         | F                | 110                                       | 108                                  | 34.4                         | D                | 35                                        | 92                                   |
|                                                                                            | <i>EB Approach</i>    |                                  | 75.7                         | F                | --                                        | --                                   | 34.4                         | D                | --                                        | --                                   |
|                                                                                            | WB Left-Thru          |                                  | 544.2                        | F                | 285                                       | 141                                  | 140.1                        | F                | 205                                       | 180                                  |
|                                                                                            | <i>WB Approach</i>    |                                  | 544.2                        | F                | --                                        | --                                   | 140.1                        | F                | --                                        | --                                   |
|                                                                                            | NB L-T-R              |                                  | 0.7                          | A                | 2                                         | 71                                   | 0.9                          | A                | 3                                         | 79                                   |
|                                                                                            | <i>NB Approach</i>    |                                  | 0.7                          | A                | --                                        | --                                   | 0.9                          | A                | --                                        | --                                   |
|                                                                                            | SB L-T-R              | 190                              | 1.5                          | A                | 5                                         | 1163                                 | 0.3                          | A                | 1                                         | 1150                                 |
|                                                                                            | <i>SB Approach</i>    |                                  | 1.5                          | A                | --                                        | --                                   | 0.3                          | A                | --                                        | --                                   |
| 3. Old Ivy Road (E-W) at Faulconer Road/Commercial Ent<br><i>Unsignalized</i>              | EB Left-Thru          |                                  | 2.3                          | A                | 8                                         | 101                                  | 0.7                          | A                | 2                                         | 98                                   |
|                                                                                            | EB Right              | 150                              | 0.0                          | A                | 0                                         | 0                                    | 0.0                          | A                | 0                                         | 0                                    |
|                                                                                            | <i>EB Approach</i>    |                                  | 2.3                          | A                | --                                        | --                                   | 0.7                          | A                | --                                        | --                                   |
|                                                                                            | WB L-T-R              |                                  | 0.0                          | A                | 0                                         | 3                                    | 0.0                          | A                | 0                                         | 4                                    |
|                                                                                            | <i>WB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                            | NB L-T-R              |                                  | 21.8                         | C                | 0                                         | 25                                   | 13.2                         | B                | 1                                         | 30                                   |
|                                                                                            | <i>NB Approach</i>    |                                  | 21.8                         | C                | --                                        | --                                   | 13.2                         | B                | --                                        | --                                   |
|                                                                                            | SB Left-Thru          |                                  | 176.1                        | F                | 1                                         | 280                                  | 62.1                         | F                | 183                                       | 218                                  |
| 4. Old Ivy Road (E-W) at Route 29 On-Ramp/Commercial Entrance (N-S)<br><i>Unsignalized</i> | EB L-T-R              |                                  | 7.7                          | A                | 47                                        | 212                                  | 9.4                          | A                | 64                                        | 320                                  |
|                                                                                            | <i>EB Approach</i>    |                                  | 7.7                          | A                | --                                        | --                                   | 9.4                          | A                | --                                        | --                                   |
|                                                                                            | WB Left-Thru          |                                  | 0.0                          | A                | 0                                         | 2                                    | 0.0                          | A                | 0                                         | 0                                    |
|                                                                                            | WB Right              | 150                              | 0.0                          | A                | 0                                         | 37                                   | 0.0                          | A                | 0                                         | 44                                   |
|                                                                                            | <i>WB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                            | NB L-T-R              |                                  | 0.0                          | A                | 0                                         | 0                                    | 93.1                         | F                | 2                                         | 16                                   |
|                                                                                            | <i>NB Approach</i>    |                                  | 0.0                          | A                | --                                        | --                                   | 93.1                         | F                | --                                        | --                                   |
| 5. Ivy Road (E-W) at Old Ivy Road (N-S)<br><i>Signalized</i>                               | EB Left               | 250                              | 9.2                          | A                | 48                                        | 82                                   | 9.2                          | A                | 38                                        | 87                                   |
|                                                                                            | EB Thru               |                                  | 16.6                         | B                | #475                                      | 323                                  | 11.2                         | B                | 285                                       | 257                                  |
|                                                                                            | <i>EB Approach</i>    |                                  | 15.8                         | B                | --                                        | --                                   | 11.1                         | B                | --                                        | --                                   |
|                                                                                            | WB Thru               |                                  | 10.8                         | B                | 189                                       | 206                                  | 16.8                         | B                | #519                                      | 349                                  |
|                                                                                            | WB Right              |                                  | 8.9                          | A                | 34                                        | 72                                   | 8.6                          | A                | 50                                        | 111                                  |
|                                                                                            | <i>WB Approach</i>    |                                  | 10.2                         | B                | --                                        | --                                   | 14.0                         | B                | --                                        | --                                   |
|                                                                                            | NB L-T-R              |                                  | 34.5                         | C                | 21                                        | 40                                   | 29.5                         | C                | 0                                         | 45                                   |
|                                                                                            | <i>NB Approach</i>    |                                  | 34.5                         | C                | --                                        | --                                   | 29.5                         | C                | --                                        | --                                   |
|                                                                                            | SB L-T-R              |                                  | 28.9                         | C                | 166                                       | 241                                  | 25.1                         | C                | 117                                       | 202                                  |
|                                                                                            | <i>SB Approach</i>    |                                  | 28.9                         | C                | --                                        | --                                   | 25.1                         | C                | --                                        | --                                   |
|                                                                                            | <b>Overall</b>        |                                  | <b>16.8</b>                  | <b>B</b>         | <b>--</b>                                 | <b>--</b>                            | <b>14.8</b>                  | <b>B</b>         | <b>--</b>                                 | <b>--</b>                            |
| A. Old Ivy Road (E-W) at Site Entrance (N)<br><i>Unsignalized</i>                          | EB Left               | 150                              | 7.8                          | A                | 3                                         | 40                                   | 8.7                          | A                | 11                                        | 70                                   |
|                                                                                            | EB Thru               |                                  | 0.0                          | A                | --                                        | --                                   | 0.0                          | A                | --                                        | --                                   |
|                                                                                            | <i>EB Approach</i>    |                                  | 1.0                          | A                | --                                        | --                                   | 3.9                          | A                | --                                        | --                                   |
|                                                                                            | WB Thru               |                                  | 0.0                          | †                | 0                                         | 0                                    | 0.0                          | †                | 0                                         | 0                                    |
|                                                                                            | WB Right              | 150                              | 0.0                          | †                | 0                                         | 0                                    | 0.0                          | †                | 0                                         | 17                                   |
|                                                                                            | <i>WB Approach</i>    |                                  | 0.0                          | †                | --                                        | --                                   | 0.0                          | †                | --                                        | --                                   |
|                                                                                            | SB Left-Right         |                                  | 14.5                         | B                | 45                                        | 103                                  | 16.2                         | C                | 32                                        | 108                                  |
|                                                                                            | <i>SB Approach</i>    |                                  | 14.5                         | B                | --                                        | --                                   | 16.2                         | C                | --                                        | --                                   |

<sup>1</sup> Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

# - 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

### 5.3 YEAR-TO-YEAR ANALYSIS COMPARISON

Table 5-2 provides a comparison of the 2021 existing, 2025 background, and 2025 future intersection LOS and delay, as provided throughout the report.

At the signalized intersection of Ivy Road and Canterbury Road, the overall intersection operates with multiple issues and delays under all 3 analyzed conditions. The additional site traffic will add delay to the southbound approach, the westbound through-right movement, and the eastbound left turn movement. Overall, this intersection operates poorly today and in background conditions and the introduction of site traffic will only marginally increase delays.

At the unsignalized intersection of Old Ivy Road and the US Route 29/250 Off-Ramp, the volume of traffic on the southbound approach from the US Route 29/250 Off-Ramp overwhelms all other movements at the intersection. Under existing and background conditions, the Old Ivy Road eastbound and westbound approaches operate with high delays and limited opportunities to enter the intersection. The addition of site traffic increases the delays for westbound Old Ivy Road to access Canterbury Road and the adjacent signal to US Route 250 (Ivy Road).

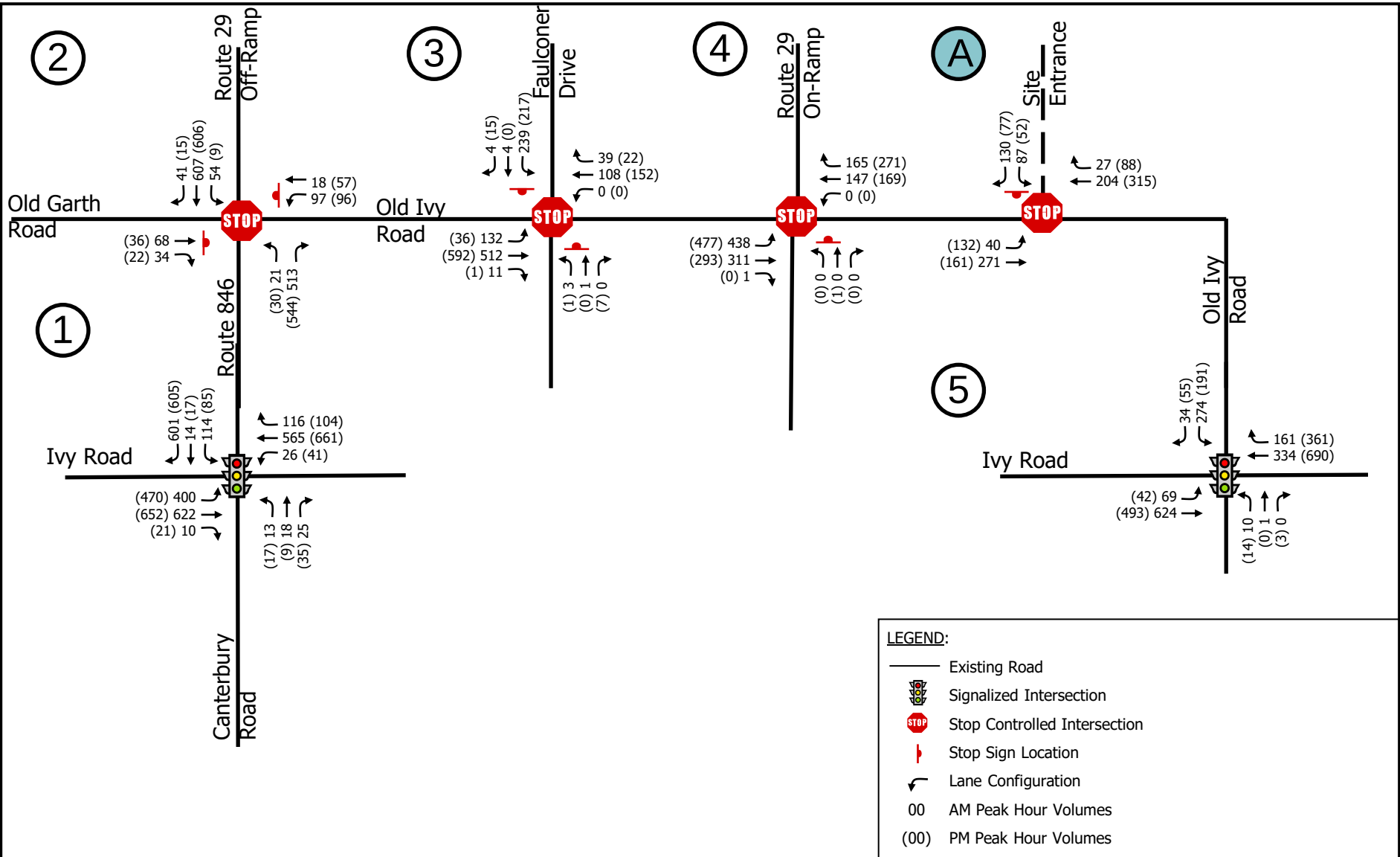
At the unsignalized intersection of Old Ivy Road and Faulconer Road, mainline Old Ivy Road in both directions operates well under all analyzed conditions. The northbound approach of Faulconer Road operates well but experiences much lower volumes, which contribute to the acceptable operations. The southbound approach of Faulconer Road experiences major delays during both the AM and PM peak hour during all 3 analyzed conditions. The heavy volume of traffic using the US Route 29/250 Off-Ramp and then traveling to Old Ivy Road via Faulconer Road are in conflict with the high through volumes on Old Ivy Road. The queues and delays for the southbound approach have the potential to create queuing and safety issues for the US Route 29/250 Off-Ramp under all 3 analyzed conditions.

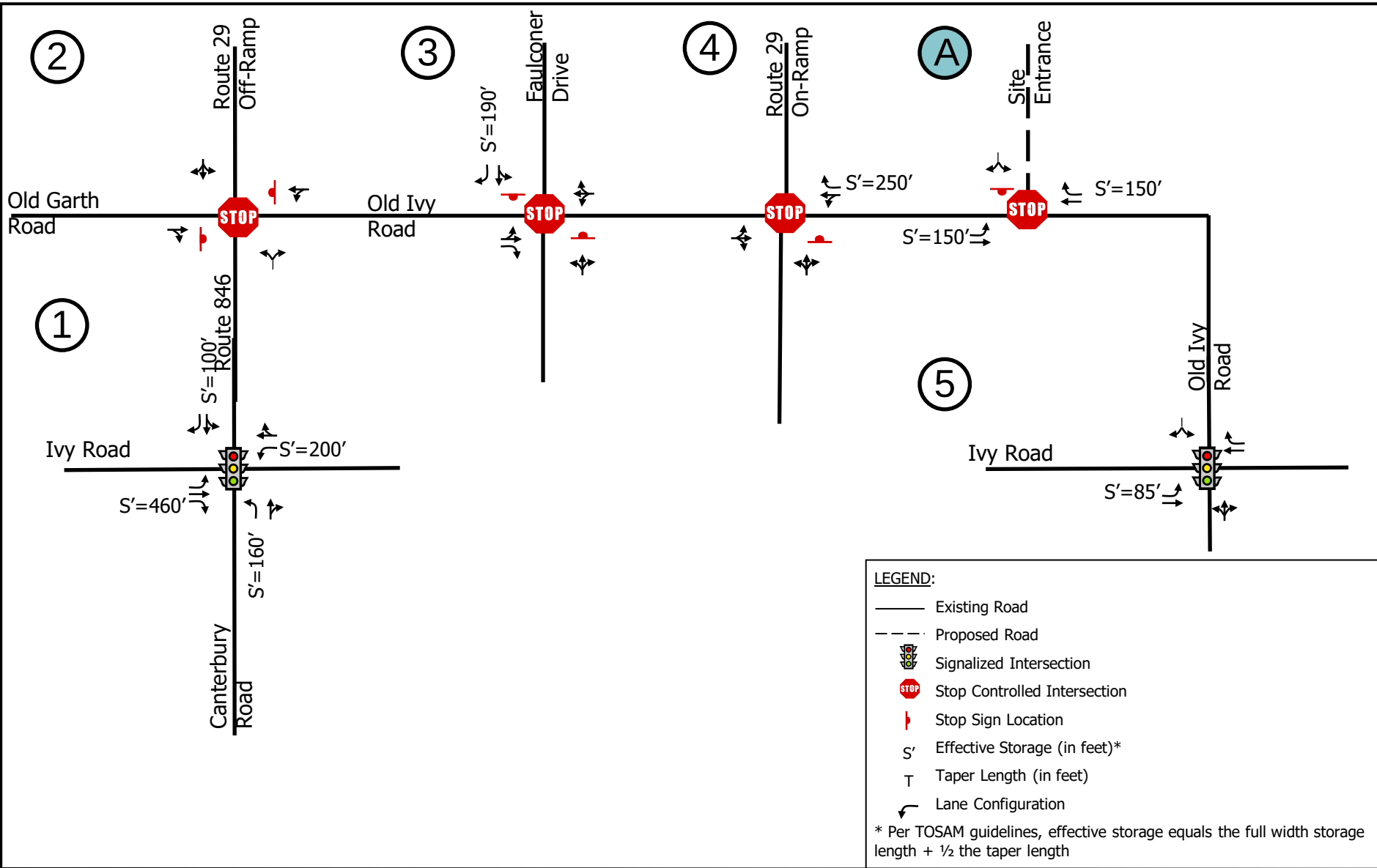
At the unsignalized intersection of Old Ivy Road and the US Route 29/250 On-Ramp, all 3 analyzed conditions show acceptable levels of service and minimal delays. The addition of site traffic does not impact the operations of the Old Ivy Road mainline approaches. The northbound approach from the parking lot of an adjacent development currently operates with a level of service F and continues to do so under background and future conditions. However, this approach has less than 5 vehicles, which is the basis for the high delay on that approach.

At the signalized intersection of Old Ivy Road and Ivy Road, there are no operational issues under existing, background, or future conditions. The addition of site traffic will not adversely affect the signal operations and there are minimal to no queuing issues observed. The signal will continue to operate with acceptable levels of service and delay under all analyzed conditions.

**Table 5-2: LOS, Delay, and Queue Length Summary 2025 Future Conditions**

| Intersection and Type of Control                                                                  | Movement and Approach | 2021 Existing Conditions        |                  |                                 |                  | 2025 Background Conditions      |                  |                                 |                  | 2025 Total Conditions           |                  |                                 |                  |
|---------------------------------------------------------------------------------------------------|-----------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|---------------------------------|------------------|
|                                                                                                   |                       | AM PEAK HOUR                    |                  | PM PEAK HOUR                    |                  | AM PEAK HOUR                    |                  | PM PEAK HOUR                    |                  | AM PEAK HOUR                    |                  | PM PEAK HOUR                    |                  |
|                                                                                                   |                       | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> | Delay <sup>1</sup><br>(sec/veh) | LOS <sup>1</sup> |
| 1. Ivy Road (E-W) at<br>Cantebury Road/Route 846 (N-S)<br><i>Signalized</i>                       | EB Left               | 58.4                            | E                | 56.8                            | E                | 56.9                            | E                | 53.8                            | D                | 52.1                            | D                | 71.6                            | E                |
|                                                                                                   | EB Thru               | 17.8                            | B                | 16.9                            | B                | 18.2                            | B                | 18.8                            | B                | 18.8                            | B                | 19.0                            | B                |
|                                                                                                   | EB Right              | 9.9                             | A                | 9.7                             | A                | 9.9                             | A                | 10.4                            | B                | 10.2                            | B                | 10.5                            | B                |
|                                                                                                   | <i>EB Approach</i>    | <i>33.2</i>                     | <i>C</i>         | <i>32.5</i>                     | <i>C</i>         | <i>32.9</i>                     | <i>C</i>         | <i>32.4</i>                     | <i>C</i>         | <i>31.6</i>                     | <i>C</i>         | <i>40.5</i>                     | <i>D</i>         |
|                                                                                                   | WB Left               | 19.1                            | B                | 18.5                            | B                | 20.0                            | B                | 20.4                            | C                | 22.1                            | C                | 20.9                            | C                |
|                                                                                                   | WB Thru-Right         | 64.5                            | E                | 58.4                            | E                | 80.6                            | F                | 92.2                            | F                | 112.1                           | F                | 113.7                           | F                |
|                                                                                                   | <i>WB Approach</i>    | <i>62.8</i>                     | <i>E</i>         | <i>56.2</i>                     | <i>E</i>         | <i>78.4</i>                     | <i>E</i>         | <i>88.3</i>                     | <i>F</i>         | <i>108.8</i>                    | <i>F</i>         | <i>108.9</i>                    | <i>F</i>         |
|                                                                                                   | NB Left-Thru          | 55.4                            | E                | 55.2                            | E                | 55.4                            | E                | 55.2                            | E                | 55.4                            | E                | 55.2                            | E                |
|                                                                                                   | NB Right              | 53.8                            | D                | 53.9                            | D                | 53.8                            | D                | 53.9                            | D                | 53.8                            | D                | 53.9                            | D                |
|                                                                                                   | <i>NB Approach</i>    | <i>54.7</i>                     | <i>D</i>         | <i>54.5</i>                     | <i>D</i>         | <i>54.7</i>                     | <i>D</i>         | <i>54.5</i>                     | <i>D</i>         | <i>54.7</i>                     | <i>D</i>         | <i>54.5</i>                     | <i>D</i>         |
|                                                                                                   | SB Thru-Left          | 58.9                            | E                | 67.3                            | E                | 59.9                            | E                | 56.8                            | E                | 71.4                            | E                | 61.7                            | E                |
|                                                                                                   | SB Right              | 54.7                            | D                | 53.9                            | D                | 56.6                            | E                | 50.2                            | D                | 56.9                            | E                | 54.5                            | D                |
|                                                                                                   | <i>SB Approach</i>    | <i>55.3</i>                     | <i>E</i>         | <i>55.6</i>                     | <i>E</i>         | <i>57.1</i>                     | <i>E</i>         | <i>51.0</i>                     | <i>D</i>         | <i>59.5</i>                     | <i>E</i>         | <i>55.6</i>                     | <i>E</i>         |
|                                                                                                   | <b>Overall</b>        | <b>48.2</b>                     | <b>D</b>         | <b>45.9</b>                     | <b>D</b>         | <b>53.0</b>                     | <b>D</b>         | <b>54.0</b>                     | <b>D</b>         | <b>61.8</b>                     | <b>E</b>         | <b>64.7</b>                     | <b>E</b>         |
| 2. Old Ivy Road (E-W) at<br>29 Off Ramp/Route 846 (N-S)<br><i>Unsignalized</i>                    | EB Thru-Right         | 87.3                            | F                | 27.5                            | D                | 69.8                            | F                | 30.2                            | D                | 75.7                            | F                | 34.4                            | D                |
|                                                                                                   | <i>EB Approach</i>    | <i>87.3</i>                     | <i>F</i>         | <i>27.5</i>                     | <i>D</i>         | <i>69.8</i>                     | <i>F</i>         | <i>30.2</i>                     | <i>D</i>         | <i>75.7</i>                     | <i>F</i>         | <i>34.4</i>                     | <i>D</i>         |
|                                                                                                   | WB Left-Thru          | 167.7                           | F                | 47.1                            | E                | 108.1                           | F                | 58.7                            | F                | 544.2                           | F                | 140.1                           | F                |
|                                                                                                   | <i>WB Approach</i>    | <i>167.7</i>                    | <i>F</i>         | <i>47.1</i>                     | <i>E</i>         | <i>108.1</i>                    | <i>F</i>         | <i>58.7</i>                     | <i>F</i>         | <i>544.2</i>                    | <i>F</i>         | <i>140.1</i>                    | <i>F</i>         |
|                                                                                                   | NB L-T-R              | 0.7                             | A                | 0.9                             | A                | 0.7                             | A                | 0.9                             | A                | 0.7                             | A                | 0.9                             | A                |
|                                                                                                   | <i>NB Approach</i>    | <i>0.7</i>                      | <i>A</i>         | <i>0.9</i>                      | <i>A</i>         | <i>0.7</i>                      | <i>A</i>         | <i>0.9</i>                      | <i>A</i>         | <i>0.7</i>                      | <i>A</i>         | <i>0.9</i>                      | <i>A</i>         |
|                                                                                                   | SB L-T-R              | 1.5                             | A                | 0.3                             | A                | 1.5                             | A                | 0.3                             | A                | 1.5                             | A                | 0.3                             | A                |
|                                                                                                   | <i>SB Approach</i>    | <i>1.5</i>                      | <i>A</i>         | <i>0.3</i>                      | <i>A</i>         | <i>1.5</i>                      | <i>A</i>         | <i>0.3</i>                      | <i>A</i>         | <i>1.5</i>                      | <i>A</i>         | <i>0.3</i>                      | <i>A</i>         |
| 3. Old Ivy Road (E-W) at<br>Faulconer Road/Commercial Ent<br><i>Unsignalized</i>                  | EB Left-Thru          | 2.6                             | A                | 0.7                             | A                | 2.3                             | A                | 0.8                             | A                | 2.3                             | A                | 0.7                             | A                |
|                                                                                                   | EB Right              | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                |
|                                                                                                   | <i>EB Approach</i>    | <i>2.6</i>                      | <i>A</i>         | <i>0.7</i>                      | <i>A</i>         | <i>2.3</i>                      | <i>A</i>         | <i>0.8</i>                      | <i>A</i>         | <i>2.3</i>                      | <i>A</i>         | <i>0.7</i>                      | <i>A</i>         |
|                                                                                                   | WB L-T-R              | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                |
|                                                                                                   | <i>WB Approach</i>    | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         |
|                                                                                                   | NB L-T-R              | 25.3                            | D                | 11.7                            | B                | 19.4                            | C                | 12.3                            | B                | 21.8                            | C                | 13.2                            | B                |
|                                                                                                   | <i>NB Approach</i>    | <i>25.3</i>                     | <i>D</i>         | <i>11.7</i>                     | <i>B</i>         | <i>19.4</i>                     | <i>C</i>         | <i>12.3</i>                     | <i>B</i>         | <i>21.8</i>                     | <i>C</i>         | <i>13.2</i>                     | <i>B</i>         |
|                                                                                                   | SB Left-Thru          | 349.1                           | F                | 20.0                            | C                | 85.7                            | F                | 25.1                            | D                | 176.1                           | F                | 62.1                            | F                |
|                                                                                                   | SB Right              | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                |
|                                                                                                   | <i>SB Approach</i>    | <i>349.1</i>                    | <i>F</i>         | <i>20.0</i>                     | <i>C</i>         | <i>85.7</i>                     | <i>F</i>         | <i>25.1</i>                     | <i>D</i>         | <i>176.1</i>                    | <i>F</i>         | <i>62.1</i>                     | <i>F</i>         |
| 4. Old Ivy Road (E-W) at<br>Route 29 On-Ramp/<br>Commercial Entrance (N-S)<br><i>Unsignalized</i> | EB L-T-R              | 7.4                             | A                | 8.8                             | A                | 7.0                             | A                | 9.1                             | A                | 7.7                             | A                | 9.4                             | A                |
|                                                                                                   | <i>EB Approach</i>    | <i>7.4</i>                      | <i>A</i>         | <i>8.8</i>                      | <i>A</i>         | <i>7.0</i>                      | <i>A</i>         | <i>9.1</i>                      | <i>A</i>         | <i>7.7</i>                      | <i>A</i>         | <i>9.4</i>                      | <i>A</i>         |
|                                                                                                   | WB Left-Thru          | 0.0                             | †                | 0.0                             | †                | 0.0                             | A                | 0.0                             | †                | 0.0                             | A                | 0.0                             | A                |
|                                                                                                   | WB Right              | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                | 0.0                             | A                |
|                                                                                                   | <i>WB Approach</i>    | <i>0.0</i>                      | <i>†</i>         | <i>0.0</i>                      | <i>†</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>†</i>         | <i>0.0</i>                      | <i>A</i>         | <i>0.0</i>                      | <i>A</i>         |
|                                                                                                   | NB L-T-R              | 0.0                             | †                | 57.5                            | †                | 0.0                             | A                | 64.8                            | †                | 0.0                             | A                | 93.1                            | F                |
|                                                                                                   | <i>NB Approach</i>    | <i>0.0</i>                      | <i>A</i>         | <i>57.5</i>                     | <i>F</i>         | <i>0.0</i>                      | <i>A</i>         | <i>64.8</i>                     | <i>F</i>         | <i>0.0</i>                      | <i>A</i>         | <i>93.1</i>                     | <i>F</i>         |
| 5. Ivy Road (E-W) at<br>Old Ivy Road (N-S)<br><i>Signalized</i>                                   | EB Left               | 7.9                             | A                | 8.0                             | A                | 7.9                             | A                | 8.3                             | A                | 9.2                             | A                | 9.2                             | A                |
|                                                                                                   | EB Thru               | 13.3                            | B                | 10.1                            | B                | 13.7                            | B                | 10.3                            | B                | 16.6                            | B                | 11.2                            | B                |
|                                                                                                   | <i>EB Approach</i>    | <i>12.7</i>                     | <i>B</i>         | <i>9.9</i>                      | <i>A</i>         | <i>13.1</i>                     | <i>B</i>         | <i>10.2</i>                     | <i>B</i>         | <i>15.8</i>                     | <i>B</i>         | <i>11.1</i>                     | <i>B</i>         |
|                                                                                                   | WB Thru               | 9.2                             | A                | 14.5                            | B                | 9.2                             | A                | 15.1                            | B                | 10.8                            | B                | 16.8                            | B                |
|                                                                                                   | WB Right              | 7.6                             | A                | 7.5                             | A                | 7.6                             | A                | 7.7                             | A                | 8.9                             | A                | 8.6                             | A                |
|                                                                                                   | <i>WB Approach</i>    | <i>8.8</i>                      | <i>A</i>         | <i>12.5</i>                     | <i>B</i>         | <i>8.8</i>                      | <i>A</i>         | <i>13.0</i>                     | <i>B</i>         | <i>10.2</i>                     | <i>B</i>         | <i>14.0</i>                     | <i>B</i>         |
|                                                                                                   | NB L-T-R              | 32.7                            | C                | 28.5                            | C                | 33.9                            | C                | 28.6                            | C                | 34.5                            | C                | 29.5                            | C                |
|                                                                                                   | <i>NB Approach</i>    | <i>32.7</i>                     | <i>C</i>         | <i>28.5</i>                     | <i>C</i>         | <i>33.9</i>                     | <i>C</i>         | <i>28.6</i>                     | <i>C</i>         | <i>34.5</i>                     | <i>C</i>         | <i>29.5</i>                     | <i>C</i>         |
|                                                                                                   | SB L-T-R              | 23.7                            | C                | 23.8                            | C                | 24.5                            | C                | 23.8                            | C                | 28.9                            | C                | 25.1                            | C                |
|                                                                                                   | <i>SB Approach</i>    | <i>23.7</i>                     | <i>C</i>         | <i>23.8</i>                     | <i>C</i>         | <i>24.5</i>                     | <i>C</i>         | <i>23.8</i>                     | <i>C</i>         | <i>28.9</i>                     | <i>C</i>         | <i>25.1</i>                     | <i>C</i>         |
|                                                                                                   | <b>Overall</b>        | <b>13.3</b>                     | <b>B</b>         | <b>13.2</b>                     | <b>B</b>         | <b>13.6</b>                     | <b>B</b>         | <b>13.5</b>                     | <b>B</b>         | <b>16.8</b>                     | <b>B</b>         | <b>14.8</b>                     | <b>B</b>         |





## **6 TURN LANE WARRANT ANALYSIS**

### **6.1 2025 FUTURE CONDITIONS ANALYSIS**

Using 2025 future traffic volumes on Figure 5-1 and the appropriate turn lane warrant nomographs from Appendix F of the VDOT *Road Design Manual*, a turn lane warrant analysis was completed for the proposed site entrance on Old Ivy Road.

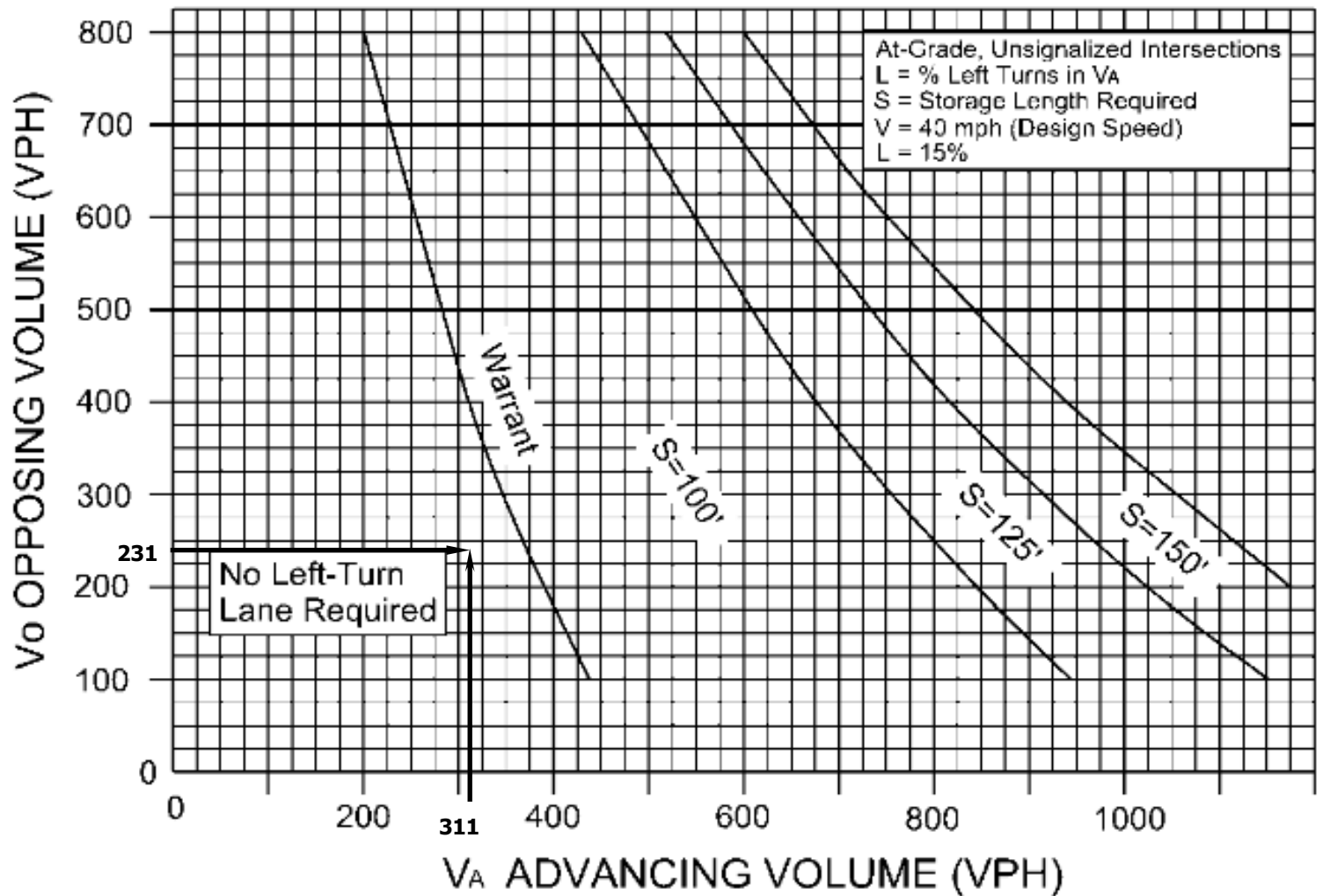
The turn lane warrants were completed for the eastbound left and the westbound right turning movements from Old Ivy Road into the proposed site entrance.

Under 2025 future conditions, both an eastbound left and a westbound right turn lane are warranted on Old Ivy Road at the proposed site entrance. The left and right turn lane warrants can be found in Figures 6-1 through 6-3.

Based on the posted speed limit (35 MPH) and the functional classification of Old Ivy Road (urban collector), a minimum taper of 100' and a minimum storage of 100' is required for all turn lanes per the VDOT *Road Design Manual*.

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**WARRANT FOR LEFT-TURN STORAGE LANES  
ON TWO-LANE HIGHWAYS (40 MPH)  
FIGURE 3-7 VDOT ROAD DESIGN MANUAL APPENDIX F**

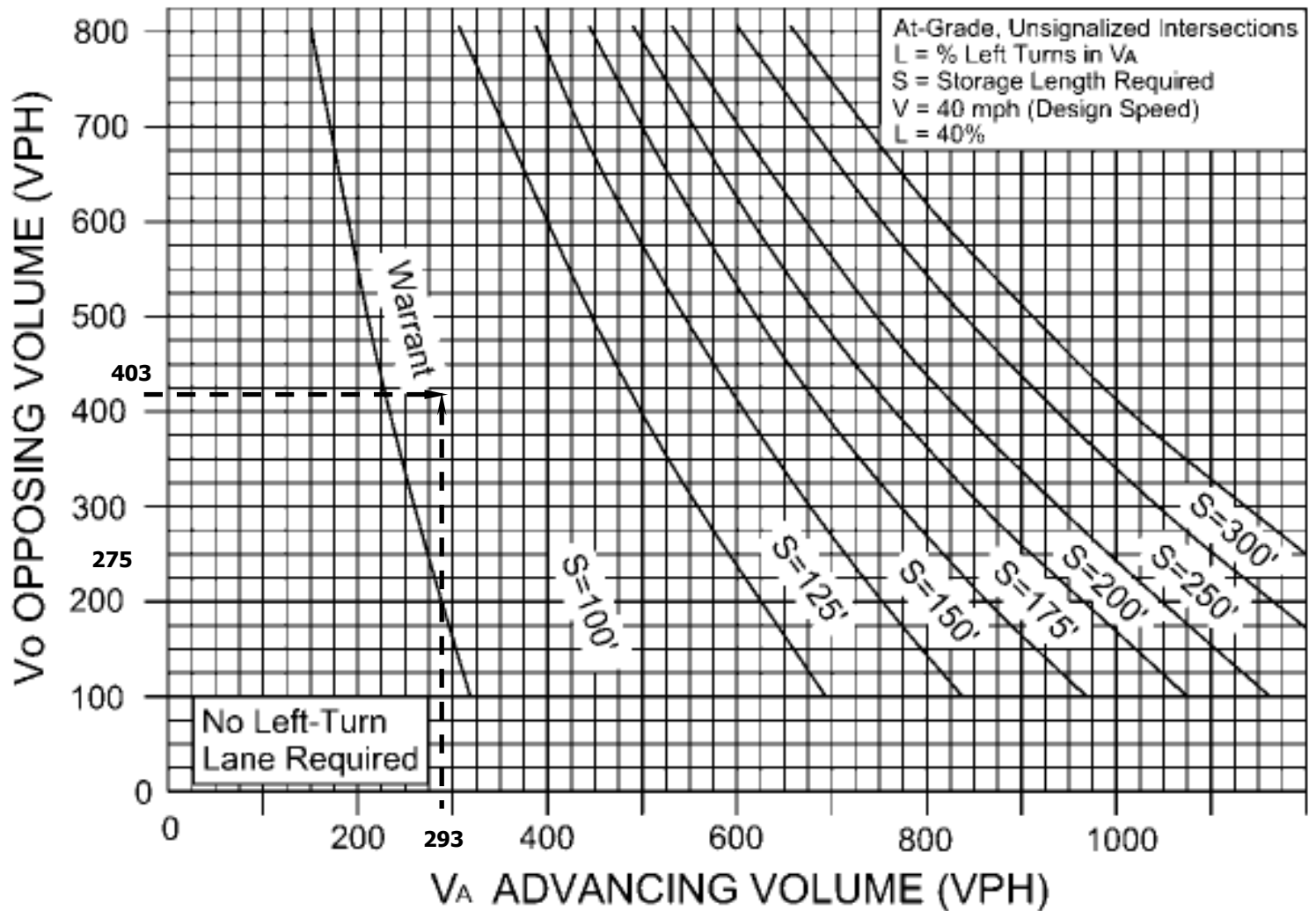


**LEGEND**

- AM Peak Hour
- - - PM Peak Hour

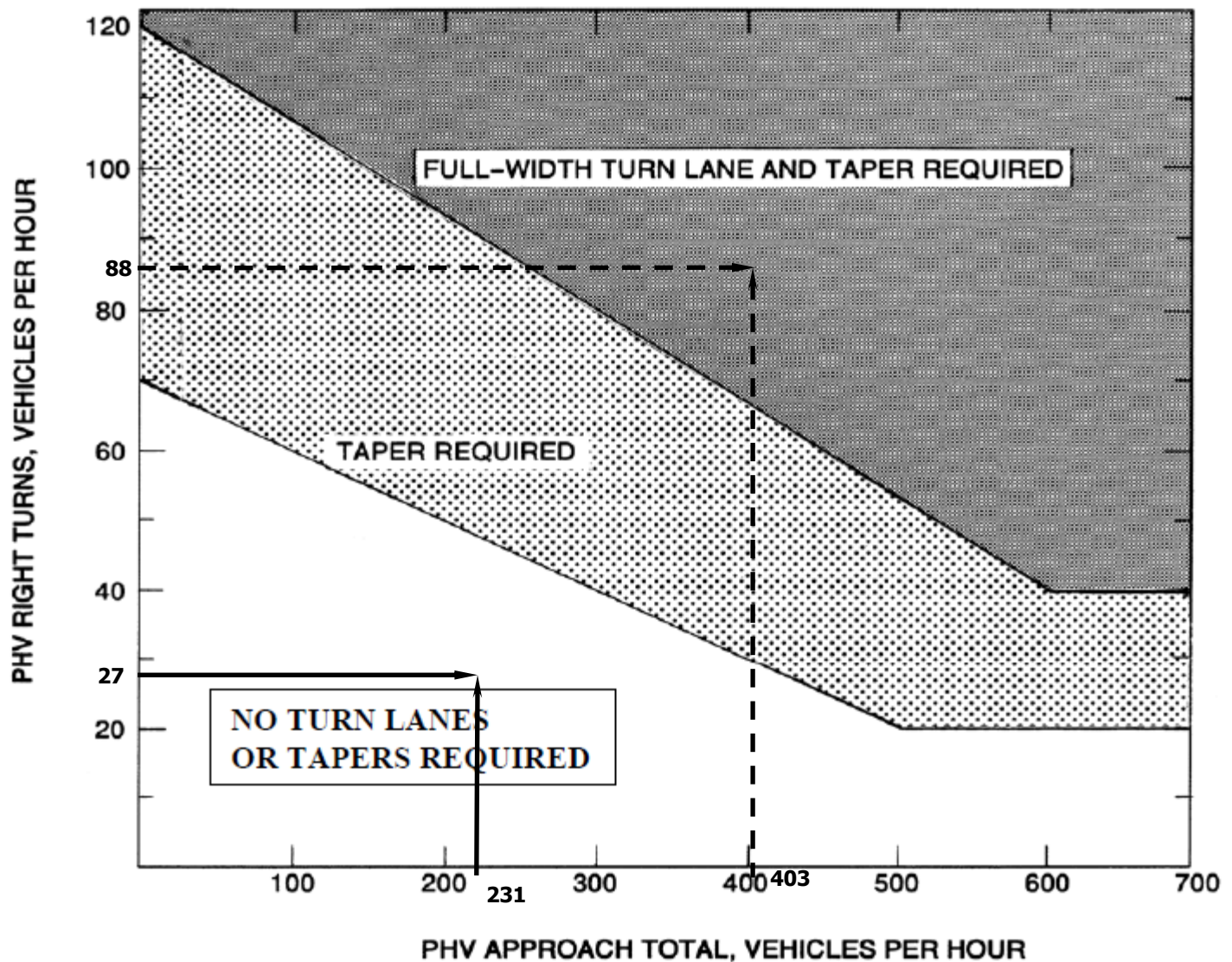
**NO LEFT TURN LANE WARRANTED**

WARRANT FOR LEFT-TURN STORAGE LANES  
ON TWO-LANE HIGHWAYS (40 MPH)  
FIGURE 3-10 VDOT ROAD DESIGN MANUAL APPENDIX F



LEFT TURN LANE WARRANTED

# GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY) FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



RIGHT TURN LANE AND TAPER WARRANTED

## LEGEND

- AM Peak Hour
- - - PM Peak Hour

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## 7 CONCLUSIONS AND RECOMMENDATIONS

### 7.1 STUDY FINDINGS

Based on the operational analyses the following is offered:

- Under the 2021 existing and 2025 background conditions:
  - The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS D in the AM and PM peaks, with queues in both mainline approaches and the southbound approach that create access issues to nearby entrances and intersections.
  - At the unsignalized intersection of Old Ivy Road and US Route 29/250 Off-Ramp, the combination of queues from the Ivy Road/Canterbury Road signal and the high volume from the US Route 29/250 Off-Ramp block access for the eastbound and westbound movements of Old Ivy Road, effectively creating a 4-way stop intersection. The US Route 29/250 Off Ramp experiences queues that extend to mainline US Route 29/250.
  - The unsignalized intersection of Old Ivy Road and Faulconer Road sees queuing issues for southbound traffic attempting to make a left onto Old Ivy Road during both peak hours. The queues at Old Ivy Road extend downstream into the US Route 29/250 Off-Ramp, which could create safety and operational issues on the ramp.
  - The unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp does not have any operational or queuing issues of note, with maximum queues of approximately 300' in the EB direction which do not interfere with other intersections or access points.
  - The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak. The only queuing issues noted are for through movement queues blocking access to nearby commercial entrances.
  - On either end of the study corridor, there are narrow railroad bridges over Old Ivy Road that severely limit the ability to widen the roadway and sometimes require vehicles to operate as if there were only a single lane. This constraint impacts the intersections of Old Ivy Road at Ivy Road, Old Ivy Road at US Route 29/250 Off-Ramp, and Ivy Road at Canterbury Road.
- Under 2025 total future conditions with the traffic from the proposed Old Ivy Road Development:
  - Overall, all existing intersections see an increase in delays and queuing with the addition of the proposed site traffic.
  - The signalized intersection of Ivy Road and Canterbury Road continues to create operational issues for the US Route 29/250 Off-Ramp, Old Ivy Road, and Faulconer Road. Without improvements to the signalized intersection or the off-ramp, operations on Old Ivy Road will not improve.
  - At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the additional site traffic does not significantly increase delays along Old Ivy Road.
  - At the signalized intersection of Old Ivy Road and Ivy Road, the increased traffic volumes do not significantly change the operations of the existing signal.
  - The proposed site entrance does not introduce any queueing or delays for mainline Old Ivy Road and the proposed turn lanes can fully accommodate the site-generated traffic.

## 7.2 RECOMMENDATIONS

In order to accommodate the increased traffic volumes associated with the proposed Old Ivy Residences residential development, the following operational and capacity improvements are recommended:

1. Install an eastbound left turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.
2. Install a westbound right turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.
3. Install a westbound right turn lane on Old Ivy Road at the US Route 29/250 on-ramp, minimum 100' storage and 100' taper.

All recommended improvements are on Old Ivy Road across the frontage of property controlled by the development of Old Ivy Residences. The proposed improvements are expected to be constructable within existing right-of-way and on the development frontage.

# **Appendix A**

## **Traffic Counts**

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# Data Collection Group

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File Name : Canterbury and Ivy

Site Code :

Start Date : 5/6/2021

Page No : 1

## Groups Printed- Passenger Veh - Trucks

|                 | Old Garth<br>From North |      |      |      |            | Ivy<br>From East |      |      |      |            | Canterbury<br>From South |      |      |      |            | Ivy<br>From West |      |      |      |            |            |
|-----------------|-------------------------|------|------|------|------------|------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------------|------|------|------|------------|------------|
| Start Time      | Right                   | Thru | Left | Peds | App. Total | Right            | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right            | Thru | Left | Peds | App. Total | Int. Total |
| 07:00 AM        | 71                      | 1    | 19   | 0    | 91         | 12               | 49   | 2    | 0    | 63         | 0                        | 1    | 1    | 0    | 2          | 0                | 82   | 39   | 0    | 121        | 277        |
| 07:15 AM        | 59                      | 0    | 16   | 0    | 75         | 15               | 59   | 0    | 0    | 74         | 2                        | 1    | 0    | 0    | 3          | 0                | 80   | 65   | 0    | 145        | 297        |
| 07:30 AM        | 84                      | 1    | 9    | 0    | 94         | 27               | 115  | 2    | 0    | 144        | 1                        | 2    | 1    | 0    | 4          | 1                | 130  | 93   | 0    | 224        | 466        |
| 07:45 AM        | 140                     | 3    | 8    | 0    | 151        | 24               | 129  | 3    | 0    | 156        | 4                        | 2    | 2    | 0    | 8          | 3                | 145  | 94   | 0    | 242        | 557        |
| Total           | 354                     | 5    | 52   | 0    | 411        | 78               | 352  | 7    | 0    | 437        | 7                        | 6    | 4    | 0    | 17         | 4                | 437  | 291  | 0    | 732        | 1597       |
| 08:00 AM        | 113                     | 2    | 30   | 0    | 145        | 32               | 117  | 6    | 0    | 155        | 3                        | 3    | 3    | 0    | 9          | 2                | 175  | 101  | 0    | 278        | 587        |
| 08:15 AM        | 127                     | 3    | 27   | 0    | 157        | 26               | 117  | 2    | 0    | 145        | 6                        | 6    | 1    | 0    | 13         | 0                | 128  | 94   | 0    | 222        | 537        |
| 08:30 AM        | 128                     | 1    | 9    | 0    | 138        | 16               | 122  | 5    | 0    | 143        | 5                        | 5    | 6    | 0    | 16         | 2                | 101  | 59   | 0    | 162        | 459        |
| 08:45 AM        | 128                     | 6    | 5    | 0    | 139        | 19               | 138  | 10   | 1    | 168        | 8                        | 2    | 1    | 0    | 11         | 5                | 139  | 87   | 0    | 231        | 549        |
| Total           | 496                     | 12   | 71   | 0    | 579        | 93               | 494  | 23   | 1    | 611        | 22                       | 16   | 11   | 0    | 49         | 9                | 543  | 341  | 0    | 893        | 2132       |
| 04:00 PM        | 146                     | 2    | 26   | 0    | 174        | 20               | 157  | 4    | 0    | 181        | 4                        | 1    | 2    | 0    | 7          | 2                | 163  | 84   | 1    | 250        | 612        |
| 04:15 PM        | 132                     | 3    | 11   | 0    | 146        | 9                | 133  | 2    | 0    | 144        | 7                        | 4    | 5    | 0    | 16         | 5                | 135  | 82   | 0    | 222        | 528        |
| 04:30 PM        | 126                     | 5    | 10   | 0    | 141        | 12               | 140  | 7    | 0    | 159        | 8                        | 2    | 2    | 0    | 12         | 4                | 141  | 115  | 0    | 260        | 572        |
| 04:45 PM        | 133                     | 1    | 15   | 0    | 149        | 20               | 128  | 9    | 0    | 157        | 6                        | 1    | 4    | 0    | 11         | 2                | 136  | 98   | 0    | 236        | 553        |
| Total           | 537                     | 11   | 62   | 0    | 610        | 61               | 558  | 22   | 0    | 641        | 25                       | 8    | 13   | 0    | 46         | 13               | 575  | 379  | 1    | 968        | 2265       |
| 05:00 PM        | 101                     | 3    | 16   | 0    | 120        | 18               | 149  | 15   | 0    | 182        | 9                        | 3    | 5    | 0    | 17         | 7                | 151  | 70   | 1    | 229        | 548        |
| 05:15 PM        | 152                     | 6    | 17   | 0    | 175        | 12               | 144  | 5    | 0    | 161        | 8                        | 2    | 4    | 0    | 14         | 5                | 142  | 99   | 0    | 246        | 596        |
| 05:30 PM        | 115                     | 3    | 5    | 0    | 123        | 7                | 129  | 8    | 0    | 144        | 7                        | 3    | 5    | 1    | 16         | 2                | 122  | 95   | 0    | 219        | 502        |
| 05:45 PM        | 139                     | 2    | 14   | 0    | 155        | 14               | 92   | 6    | 0    | 112        | 2                        | 3    | 4    | 0    | 9          | 0                | 100  | 70   | 0    | 170        | 446        |
| Total           | 507                     | 14   | 52   | 0    | 573        | 51               | 514  | 34   | 0    | 599        | 26                       | 11   | 18   | 1    | 56         | 14               | 515  | 334  | 1    | 864        | 2092       |
| Grand Total     | 1894                    | 42   | 237  | 0    | 2173       | 283              | 1918 | 86   | 1    | 2288       | 80                       | 41   | 46   | 1    | 168        | 40               | 2070 | 1345 | 2    | 3457       | 8086       |
| Apprch %        | 87.2                    | 1.9  | 10.9 | 0    |            | 12.4             | 83.8 | 3.8  | 0    |            | 47.6                     | 24.4 | 27.4 | 0.6  |            | 1.2              | 59.9 | 38.9 | 0.1  |            |            |
| Total %         | 23.4                    | 0.5  | 2.9  | 0    | 26.9       | 3.5              | 23.7 | 1.1  | 0    | 28.3       | 1                        | 0.5  | 0.6  | 0    | 2.1        | 0.5              | 25.6 | 16.6 | 0    | 42.8       |            |
| Passenger Veh   | 1848                    | 42   | 231  | 0    | 2121       | 280              | 1856 | 84   | 1    | 2221       | 77                       | 41   | 45   | 1    | 164        | 40               | 2023 | 1312 | 2    | 3377       | 7883       |
| % Passenger Veh | 97.6                    | 100  | 97.5 | 0    | 97.6       | 98.9             | 96.8 | 97.7 | 100  | 97.1       | 96.2                     | 100  | 97.8 | 100  | 97.6       | 100              | 97.7 | 97.5 | 100  | 97.7       | 97.5       |
| Trucks          | 46                      | 0    | 6    | 0    | 52         | 3                | 62   | 2    | 0    | 67         | 3                        | 0    | 1    | 0    | 4          | 0                | 47   | 33   | 0    | 80         | 203        |
| % Trucks        | 2.4                     | 0    | 2.5  | 0    | 2.4        | 1.1              | 3.2  | 2.3  | 0    | 2.9        | 3.8                      | 0    | 2.2  | 0    | 2.4        | 0                | 2.3  | 2.5  | 0    | 2.3        | 2.5        |

# Data Collection Group

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File Name : Canterbury and Ivy

Site Code :

Start Date : 5/6/2021

Page No : 2

|                                                            | Old Garth<br>From North |          |           |      |            | Ivy<br>From East |            |          |      |            | Canterbury<br>From South |          |          |      |            | Ivy<br>From West |            |            |      |            |            |
|------------------------------------------------------------|-------------------------|----------|-----------|------|------------|------------------|------------|----------|------|------------|--------------------------|----------|----------|------|------------|------------------|------------|------------|------|------------|------------|
| Start Time                                                 | Right                   | Thru     | Left      | Peds | App. Total | Right            | Thru       | Left     | Peds | App. Total | Right                    | Thru     | Left     | Peds | App. Total | Right            | Thru       | Left       | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 |                         |          |           |      |            |                  |            |          |      |            |                          |          |          |      |            |                  |            |            |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                         |          |           |      |            |                  |            |          |      |            |                          |          |          |      |            |                  |            |            |      |            |            |
| 07:30 AM                                                   | 84                      | 1        | 9         | 0    | 94         | 27               | 115        | 2        | 0    | 144        | 1                        | 2        | 1        | 0    | 4          | 1                | 130        | 93         | 0    | 224        | 466        |
| 07:45 AM                                                   | <b>140</b>              | <b>3</b> | <b>8</b>  | 0    | 151        | 24               | <b>129</b> | <b>3</b> | 0    | <b>156</b> | 4                        | 2        | 2        | 0    | 8          | <b>3</b>         | 145        | 94         | 0    | 242        | 557        |
| 08:00 AM                                                   | 113                     | 2        | <b>30</b> | 0    | 145        | <b>32</b>        | 117        | <b>6</b> | 0    | 155        | 3                        | 3        | <b>3</b> | 0    | 9          | 2                | <b>175</b> | <b>101</b> | 0    | <b>278</b> | <b>587</b> |
| 08:15 AM                                                   | 127                     | 3        | 27        | 0    | <b>157</b> | 26               | 117        | 2        | 0    | 145        | <b>6</b>                 | <b>6</b> | 1        | 0    | <b>13</b>  | 0                | 128        | 94         | 0    | 222        | 537        |
| Total Volume                                               | 464                     | 9        | 74        | 0    | 547        | 109              | 478        | 13       | 0    | 600        | 14                       | 13       | 7        | 0    | 34         | 6                | 578        | 382        | 0    | 966        | 2147       |
| % App. Total                                               | 84.8                    | 1.6      | 13.5      | 0    |            | 18.2             | 79.7       | 2.2      | 0    |            | 41.2                     | 38.2     | 20.6     | 0    |            | 0.6              | 59.8       | 39.5       | 0    |            |            |
| PHF                                                        | .829                    | .750     | .617      | .000 | .871       | .852             | .926       | .542     | .000 | .962       | .583                     | .542     | .583     | .000 | .654       | .500             | .826       | .946       | .000 | .869       | .914       |
| Passenger Veh                                              | 449                     | 9        | 72        | 0    | 530        | 108              | 446        | 13       | 0    | 567        | 13                       | 13       | 7        | 0    | 33         | 6                | 563        | 374        | 0    | 943        | 2073       |
| % Passenger Veh                                            | 96.8                    | 100      | 97.3      | 0    | 96.9       | 99.1             | 93.3       | 100      | 0    | 94.5       | 92.9                     | 100      | 100      | 0    | 97.1       | 100              | 97.4       | 97.9       | 0    | 97.6       | 96.6       |
| Trucks                                                     | 15                      | 0        | 2         | 0    | 17         | 1                | 32         | 0        | 0    | 33         | 1                        | 0        | 0        | 0    | 1          | 0                | 15         | 8          | 0    | 23         | 74         |
| % Trucks                                                   | 3.2                     | 0        | 2.7       | 0    | 3.1        | 0.9              | 6.7        | 0        | 0    | 5.5        | 7.1                      | 0        | 0        | 0    | 2.9        | 0                | 2.6        | 2.1        | 0    | 2.4        | 3.4        |

# Data Collection Group

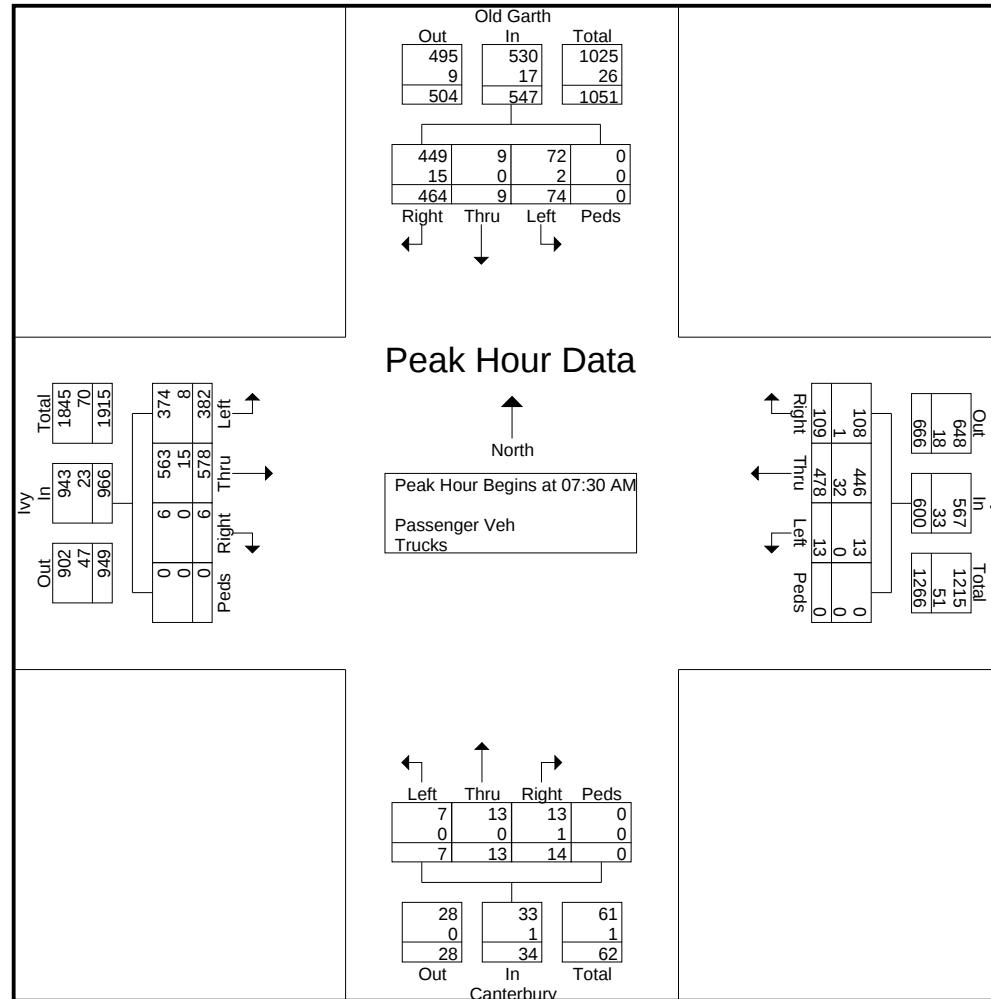
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Site Code :

Start Date : 5/6/2021

Page No : 3



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Site Code :

Start Date : 5/6/2021

Page No : 4

|                                                            | Old Garth<br>From North |      |      |      |            | Ivy<br>From East |      |      |      |            | Canterbury<br>From South |      |      |      |            | Ivy<br>From West |      |      |      |            |            |
|------------------------------------------------------------|-------------------------|------|------|------|------------|------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------------|------|------|------|------------|------------|
| Start Time                                                 | Right                   | Thru | Left | Peds | App. Total | Right            | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right            | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 |                         |      |      |      |            |                  |      |      |      |            |                          |      |      |      |            |                  |      |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:30 PM       |                         |      |      |      |            |                  |      |      |      |            |                          |      |      |      |            |                  |      |      |      |            |            |
| 04:30 PM                                                   | 126                     | 5    | 10   | 0    | 141        | 12               | 140  | 7    | 0    | 159        | 8                        | 2    | 2    | 0    | 12         | 4                | 141  | 115  | 0    | 260        | 572        |
| 04:45 PM                                                   | 133                     | 1    | 15   | 0    | 149        | 20               | 128  | 9    | 0    | 157        | 6                        | 1    | 4    | 0    | 11         | 2                | 136  | 98   | 0    | 236        | 553        |
| 05:00 PM                                                   | 101                     | 3    | 16   | 0    | 120        | 18               | 149  | 15   | 0    | 182        | 9                        | 3    | 5    | 0    | 17         | 7                | 151  | 70   | 1    | 229        | 548        |
| 05:15 PM                                                   | 152                     | 6    | 17   | 0    | 175        | 12               | 144  | 5    | 0    | 161        | 8                        | 2    | 4    | 0    | 14         | 5                | 142  | 99   | 0    | 246        | 596        |
| Total Volume                                               | 512                     | 15   | 58   | 0    | 585        | 62               | 561  | 36   | 0    | 659        | 31                       | 8    | 15   | 0    | 54         | 18               | 570  | 382  | 1    | 971        | 2269       |
| % App. Total                                               | 87.5                    | 2.6  | 9.9  | 0    |            | 9.4              | 85.1 | 5.5  | 0    |            | 57.4                     | 14.8 | 27.8 | 0    |            | 1.9              | 58.7 | 39.3 | 0.1  |            |            |
| PHF                                                        | .842                    | .625 | .853 | .000 | .836       | .775             | .941 | .600 | .000 | .905       | .861                     | .667 | .750 | .000 | .794       | .643             | .944 | .830 | .250 | .934       | .952       |
| Passenger Veh                                              | 504                     | 15   | 56   | 0    | 575        | 62               | 555  | 35   | 0    | 652        | 29                       | 8    | 14   | 0    | 51         | 18               | 562  | 371  | 1    | 952        | 2230       |
| % Passenger Veh                                            | 98.4                    | 100  | 96.6 | 0    | 98.3       | 100              | 98.9 | 97.2 | 0    | 98.9       | 93.5                     | 100  | 93.3 | 0    | 94.4       | 100              | 98.6 | 97.1 | 100  | 98.0       | 98.3       |
| Trucks                                                     | 8                       | 0    | 2    | 0    | 10         | 0                | 6    | 1    | 0    | 7          | 2                        | 0    | 1    | 0    | 3          | 0                | 8    | 11   | 0    | 19         | 39         |
| % Trucks                                                   | 1.6                     | 0    | 3.4  | 0    | 1.7        | 0                | 1.1  | 2.8  | 0    | 1.1        | 6.5                      | 0    | 6.7  | 0    | 5.6        | 0                | 1.4  | 2.9  | 0    | 2.0        | 1.7        |

# Data Collection Group

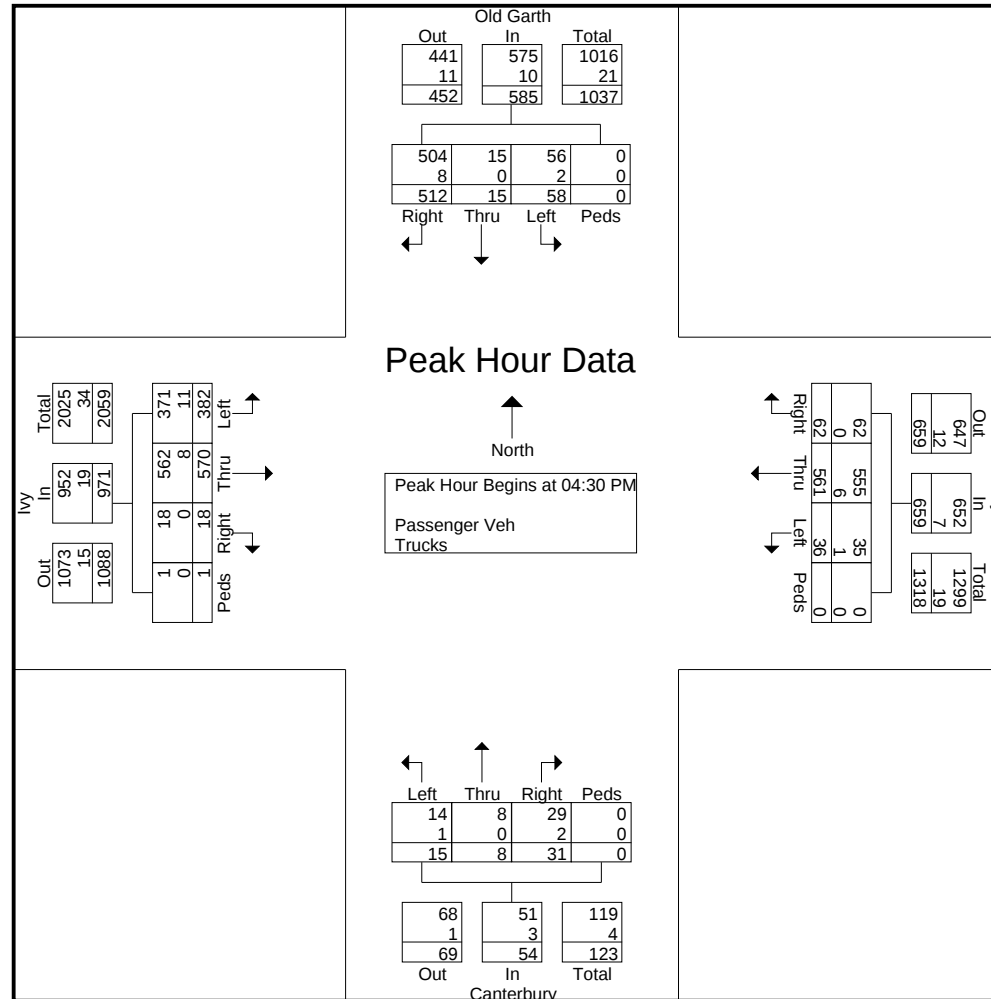
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File Name : Canterbury and Ivy

Site Code :

Start Date : 5/6/2021

Page No : 5



# Data Collection Group

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File Name : Canterbury and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 1

## Groups Printed- Passenger Veh - Trucks

|                 | 29.250 SB Off Ramp/Canterbury<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Canterbury<br>From South |      |      |      |            | Old Garth<br>From West |      |      |      |            |            |
|-----------------|---------------------------------------------|------|------|------|------------|----------------------|------|------|------|------------|--------------------------|------|------|------|------------|------------------------|------|------|------|------------|------------|
| Start Time      | Right                                       | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                    | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Int. Total |
| 07:00 AM        | 1                                           | 84   | 2    | 0    | 87         | 0                    | 1    | 5    | 0    | 6          | 54                       | 0    | 3    | 0    | 57         | 5                      | 3    | 0    | 0    | 8          | 158        |
| 07:15 AM        | 1                                           | 70   | 3    | 0    | 74         | 0                    | 0    | 7    | 0    | 7          | 78                       | 0    | 2    | 0    | 80         | 2                      | 9    | 0    | 0    | 11         | 172        |
| 07:30 AM        | 0                                           | 85   | 7    | 0    | 92         | 0                    | 0    | 3    | 0    | 3          | 118                      | 0    | 3    | 0    | 121        | 4                      | 12   | 0    | 0    | 16         | 232        |
| 07:45 AM        | 5                                           | 148  | 6    | 0    | 159        | 0                    | 1    | 3    | 0    | 4          | 116                      | 0    | 4    | 0    | 120        | 5                      | 12   | 0    | 0    | 17         | 300        |
| Total           | 7                                           | 387  | 18   | 0    | 412        | 0                    | 2    | 18   | 0    | 20         | 366                      | 0    | 12   | 0    | 378        | 16                     | 36   | 0    | 0    | 52         | 862        |
| 08:00 AM        | 10                                          | 127  | 35   | 0    | 172        | 0                    | 3    | 8    | 0    | 11         | 138                      | 0    | 2    | 0    | 140        | 7                      | 19   | 0    | 0    | 26         | 349        |
| 08:15 AM        | 16                                          | 146  | 11   | 0    | 173        | 0                    | 7    | 7    | 0    | 14         | 116                      | 0    | 9    | 0    | 125        | 10                     | 10   | 0    | 0    | 20         | 332        |
| 08:30 AM        | 5                                           | 124  | 1    | 0    | 130        | 0                    | 4    | 8    | 0    | 12         | 77                       | 0    | 4    | 0    | 81         | 4                      | 14   | 0    | 0    | 18         | 241        |
| 08:45 AM        | 4                                           | 133  | 0    | 0    | 137        | 0                    | 1    | 5    | 0    | 6          | 100                      | 0    | 3    | 0    | 103        | 9                      | 16   | 0    | 0    | 25         | 271        |
| Total           | 35                                          | 530  | 47   | 0    | 612        | 0                    | 15   | 28   | 0    | 43         | 431                      | 0    | 18   | 0    | 449        | 30                     | 59   | 0    | 0    | 89         | 1193       |
| 04:00 PM        | 10                                          | 147  | 3    | 0    | 160        | 0                    | 5    | 10   | 0    | 15         | 101                      | 0    | 9    | 0    | 110        | 5                      | 7    | 0    | 0    | 12         | 297        |
| 04:15 PM        | 5                                           | 140  | 1    | 0    | 146        | 0                    | 5    | 10   | 0    | 15         | 86                       | 0    | 6    | 0    | 92         | 7                      | 8    | 0    | 0    | 15         | 268        |
| 04:30 PM        | 3                                           | 124  | 1    | 0    | 128        | 0                    | 18   | 13   | 0    | 31         | 121                      | 0    | 9    | 0    | 130        | 3                      | 7    | 0    | 0    | 10         | 299        |
| 04:45 PM        | 0                                           | 137  | 3    | 0    | 140        | 0                    | 12   | 13   | 0    | 25         | 113                      | 0    | 5    | 0    | 118        | 5                      | 10   | 0    | 0    | 15         | 298        |
| Total           | 18                                          | 548  | 8    | 0    | 574        | 0                    | 40   | 46   | 0    | 86         | 421                      | 0    | 29   | 0    | 450        | 20                     | 32   | 0    | 0    | 52         | 1162       |
| 05:00 PM        | 2                                           | 114  | 4    | 0    | 120        | 0                    | 7    | 18   | 0    | 25         | 81                       | 0    | 9    | 0    | 90         | 2                      | 6    | 0    | 0    | 8          | 243        |
| 05:15 PM        | 8                                           | 154  | 0    | 1    | 163        | 0                    | 13   | 6    | 0    | 19         | 102                      | 0    | 3    | 0    | 105        | 9                      | 9    | 0    | 0    | 18         | 305        |
| 05:30 PM        | 8                                           | 125  | 1    | 0    | 134        | 0                    | 7    | 7    | 0    | 14         | 103                      | 0    | 3    | 0    | 106        | 4                      | 4    | 0    | 0    | 8          | 262        |
| 05:45 PM        | 5                                           | 132  | 2    | 0    | 139        | 0                    | 10   | 11   | 0    | 21         | 84                       | 0    | 7    | 0    | 91         | 4                      | 4    | 0    | 0    | 8          | 259        |
| Total           | 23                                          | 525  | 7    | 1    | 556        | 0                    | 37   | 42   | 0    | 79         | 370                      | 0    | 22   | 0    | 392        | 19                     | 23   | 0    | 0    | 42         | 1069       |
| Grand Total     | 83                                          | 1990 | 80   | 1    | 2154       | 0                    | 94   | 134  | 0    | 228        | 1588                     | 0    | 81   | 0    | 1669       | 85                     | 150  | 0    | 0    | 235        | 4286       |
| Apprch %        | 3.9                                         | 92.4 | 3.7  | 0    |            | 0                    | 41.2 | 58.8 | 0    |            | 95.1                     | 0    | 4.9  | 0    |            | 36.2                   | 63.8 | 0    | 0    |            |            |
| Total %         | 1.9                                         | 46.4 | 1.9  | 0    | 50.3       | 0                    | 2.2  | 3.1  | 0    | 5.3        | 37.1                     | 0    | 1.9  | 0    | 38.9       | 2                      | 3.5  | 0    | 0    | 5.5        |            |
| Passenger Veh   | 82                                          | 1944 | 80   | 1    | 2107       | 0                    | 94   | 128  | 0    | 222        | 1559                     | 0    | 81   | 0    | 1640       | 83                     | 150  | 0    | 0    | 233        | 4202       |
| % Passenger Veh | 98.8                                        | 97.7 | 100  | 100  | 97.8       | 0                    | 100  | 95.5 | 0    | 97.4       | 98.2                     | 0    | 100  | 0    | 98.3       | 97.6                   | 100  | 0    | 0    | 99.1       | 98         |
| Trucks          | 1                                           | 46   | 0    | 0    | 47         | 0                    | 0    | 6    | 0    | 6          | 29                       | 0    | 0    | 0    | 29         | 2                      | 0    | 0    | 0    | 2          | 84         |
| % Trucks        | 1.2                                         | 2.3  | 0    | 0    | 2.2        | 0                    | 0    | 4.5  | 0    | 2.6        | 1.8                      | 0    | 0    | 0    | 1.7        | 2.4                    | 0    | 0    | 0    | 0.9        | 2          |

# Data Collection Group

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Page No : 2

|                                                            | 29.250 SB Off Ramp/Canterbury<br>From North |            |           |      |            | Old Ivy<br>From East |      |          |      |            | Canterbury<br>From South |      |          |      |            | Old Garth<br>From West |           |      |      |            |            |
|------------------------------------------------------------|---------------------------------------------|------------|-----------|------|------------|----------------------|------|----------|------|------------|--------------------------|------|----------|------|------------|------------------------|-----------|------|------|------------|------------|
| Start Time                                                 | Right                                       | Thru       | Left      | Peds | App. Total | Right                | Thru | Left     | Peds | App. Total | Right                    | Thru | Left     | Peds | App. Total | Right                  | Thru      | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 |                                             |            |           |      |            |                      |      |          |      |            |                          |      |          |      |            |                        |           |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:45 AM       |                                             |            |           |      |            |                      |      |          |      |            |                          |      |          |      |            |                        |           |      |      |            |            |
| 07:45 AM                                                   | 5                                           | <b>148</b> | 6         | 0    | 159        | 0                    | 1    | 3        | 0    | 4          | 116                      | 0    | 4        | 0    | 120        | 5                      | 12        | 0    | 0    | 17         | 300        |
| 08:00 AM                                                   | 10                                          | 127        | <b>35</b> | 0    | 172        | 0                    | 3    | <b>8</b> | 0    | 11         | <b>138</b>               | 0    | 2        | 0    | <b>140</b> | 7                      | <b>19</b> | 0    | 0    | <b>26</b>  | <b>349</b> |
| 08:15 AM                                                   | <b>16</b>                                   | 146        | 11        | 0    | <b>173</b> | 0                    | 7    | 7        | 0    | <b>14</b>  | 116                      | 0    | <b>9</b> | 0    | 125        | <b>10</b>              | 10        | 0    | 0    | 20         | 332        |
| 08:30 AM                                                   | 5                                           | 124        | 1         | 0    | 130        | 0                    | 4    | 8        | 0    | 12         | 77                       | 0    | 4        | 0    | 81         | 4                      | 14        | 0    | 0    | 18         | 241        |
| Total Volume                                               | 36                                          | 545        | 53        | 0    | 634        | 0                    | 15   | 26       | 0    | 41         | 447                      | 0    | 19       | 0    | 466        | 26                     | 55        | 0    | 0    | 81         | 1222       |
| % App. Total                                               | 5.7                                         | 86         | 8.4       | 0    |            | 0                    | 36.6 | 63.4     | 0    |            | 95.9                     | 0    | 4.1      | 0    |            | 32.1                   | 67.9      | 0    | 0    |            |            |
| PHF                                                        | .563                                        | .921       | .379      | .000 | .916       | .000                 | .536 | .813     | .000 | .732       | .810                     | .000 | .528     | .000 | .832       | .650                   | .724      | .000 | .000 | .779       | .875       |
| Passenger Veh                                              | 36                                          | 527        | 53        | 0    | 616        | 0                    | 15   | 24       | 0    | 39         | 438                      | 0    | 19       | 0    | 457        | 26                     | 55        | 0    | 0    | 81         | 1193       |
| % Passenger Veh                                            | 100                                         | 96.7       | 100       | 0    | 97.2       | 0                    | 100  | 92.3     | 0    | 95.1       | 98.0                     | 0    | 100      | 0    | 98.1       | 100                    | 100       | 0    | 0    | 100        | 97.6       |
| Trucks                                                     | 0                                           | 18         | 0         | 0    | 18         | 0                    | 0    | 2        | 0    | 2          | 9                        | 0    | 0        | 0    | 9          | 0                      | 0         | 0    | 0    | 0          | 29         |
| % Trucks                                                   | 0                                           | 3.3        | 0         | 0    | 2.8        | 0                    | 0    | 7.7      | 0    | 4.9        | 2.0                      | 0    | 0        | 0    | 1.9        | 0                      | 0         | 0    | 0    | 0          | 2.4        |

# Data Collection Group

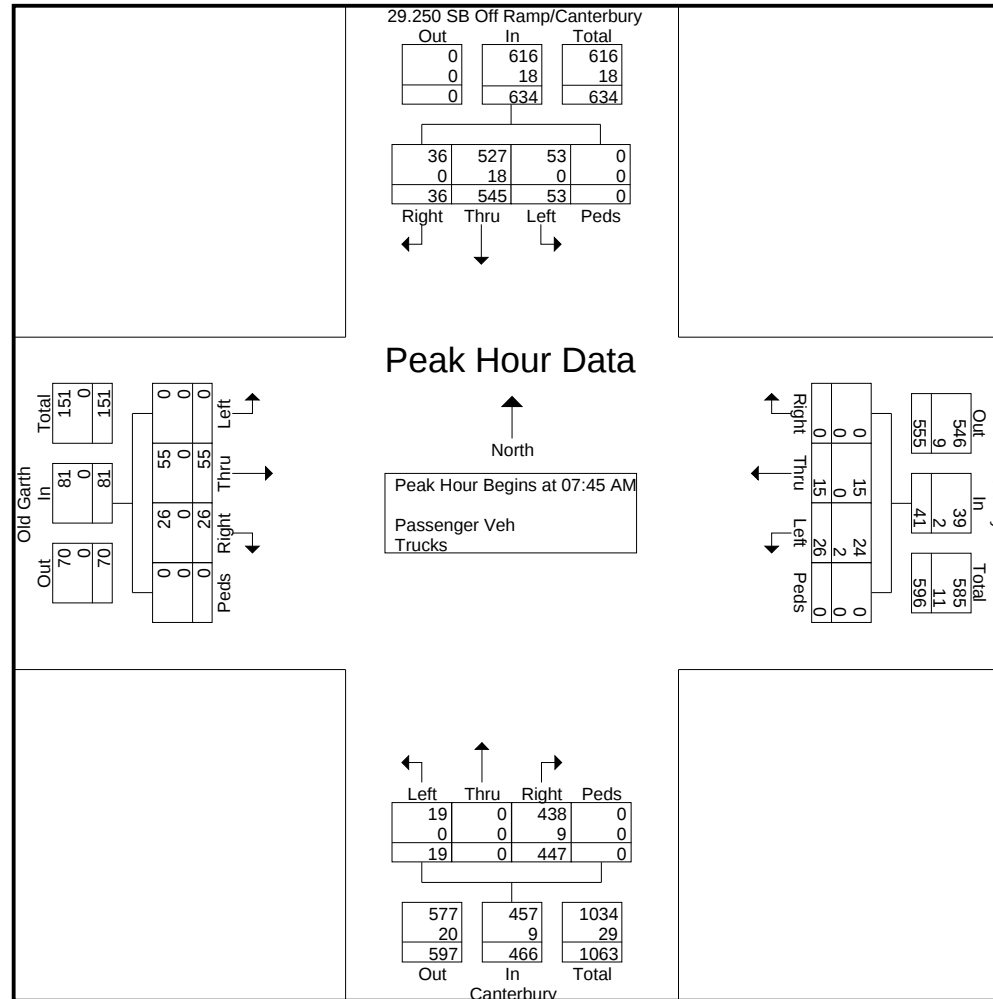
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Start Date : 5/6/2021

Page No : 3



# Data Collection Group

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Site Code :

Start Date : 5/6/2021

Page No : 4

|                                                            | 29.250 SB Off Ramp/Canterbury<br>From North |            |          |      |            | Old Ivy<br>From East |           |           |      |            | Canterbury<br>From South |      |          |      |            | Old Garth<br>From West |           |      |      |            |            |
|------------------------------------------------------------|---------------------------------------------|------------|----------|------|------------|----------------------|-----------|-----------|------|------------|--------------------------|------|----------|------|------------|------------------------|-----------|------|------|------------|------------|
| Start Time                                                 | Right                                       | Thru       | Left     | Peds | App. Total | Right                | Thru      | Left      | Peds | App. Total | Right                    | Thru | Left     | Peds | App. Total | Right                  | Thru      | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 |                                             |            |          |      |            |                      |           |           |      |            |                          |      |          |      |            |                        |           |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:00 PM       |                                             |            |          |      |            |                      |           |           |      |            |                          |      |          |      |            |                        |           |      |      |            |            |
| 04:00 PM                                                   | <b>10</b>                                   | <b>147</b> | <b>3</b> | 0    | <b>160</b> | 0                    | 5         | 10        | 0    | 15         | 101                      | 0    | <b>9</b> | 0    | 110        | 5                      | 7         | 0    | 0    | 12         | 297        |
| 04:15 PM                                                   | 5                                           | 140        | 1        | 0    | 146        | 0                    | 5         | 10        | 0    | 15         | 86                       | 0    | 6        | 0    | 92         | <b>7</b>               | 8         | 0    | 0    | <b>15</b>  | 268        |
| 04:30 PM                                                   | 3                                           | 124        | 1        | 0    | 128        | 0                    | <b>18</b> | <b>13</b> | 0    | <b>31</b>  | <b>121</b>               | 0    | 9        | 0    | <b>130</b> | 3                      | 7         | 0    | 0    | 10         | <b>299</b> |
| 04:45 PM                                                   | 0                                           | 137        | 3        | 0    | 140        | 0                    | 12        | 13        | 0    | 25         | 113                      | 0    | 5        | 0    | 118        | 5                      | <b>10</b> | 0    | 0    | 15         | 298        |
| Total Volume                                               | 18                                          | 548        | 8        | 0    | 574        | 0                    | 40        | 46        | 0    | 86         | 421                      | 0    | 29       | 0    | 450        | 20                     | 32        | 0    | 0    | 52         | 1162       |
| % App. Total                                               | 3.1                                         | 95.5       | 1.4      | 0    |            | 0                    | 46.5      | 53.5      | 0    |            | 93.6                     | 0    | 6.4      | 0    |            | 38.5                   | 61.5      | 0    | 0    |            |            |
| PHF                                                        | .450                                        | .932       | .667     | .000 | .897       | .000                 | .556      | .885      | .000 | .694       | .870                     | .000 | .806     | .000 | .865       | .714                   | .800      | .000 | .000 | .867       | .972       |
| Passenger Veh                                              | 18                                          | 547        | 8        | 0    | 573        | 0                    | 40        | 45        | 0    | 85         | 413                      | 0    | 29       | 0    | 442        | 20                     | 32        | 0    | 0    | 52         | 1152       |
| % Passenger Veh                                            | 100                                         | 99.8       | 100      | 0    | 99.8       | 0                    | 100       | 97.8      | 0    | 98.8       | 98.1                     | 0    | 100      | 0    | 98.2       | 100                    | 100       | 0    | 0    | 100        | 99.1       |
| Trucks                                                     | 0                                           | 1          | 0        | 0    | 1          | 0                    | 0         | 1         | 0    | 1          | 8                        | 0    | 0        | 0    | 8          | 0                      | 0         | 0    | 0    | 0          | 10         |
| % Trucks                                                   | 0                                           | 0.2        | 0        | 0    | 0.2        | 0                    | 0         | 2.2       | 0    | 1.2        | 1.9                      | 0    | 0        | 0    | 1.8        | 0                      | 0         | 0    | 0    | 0          | 0.9        |

# Data Collection Group

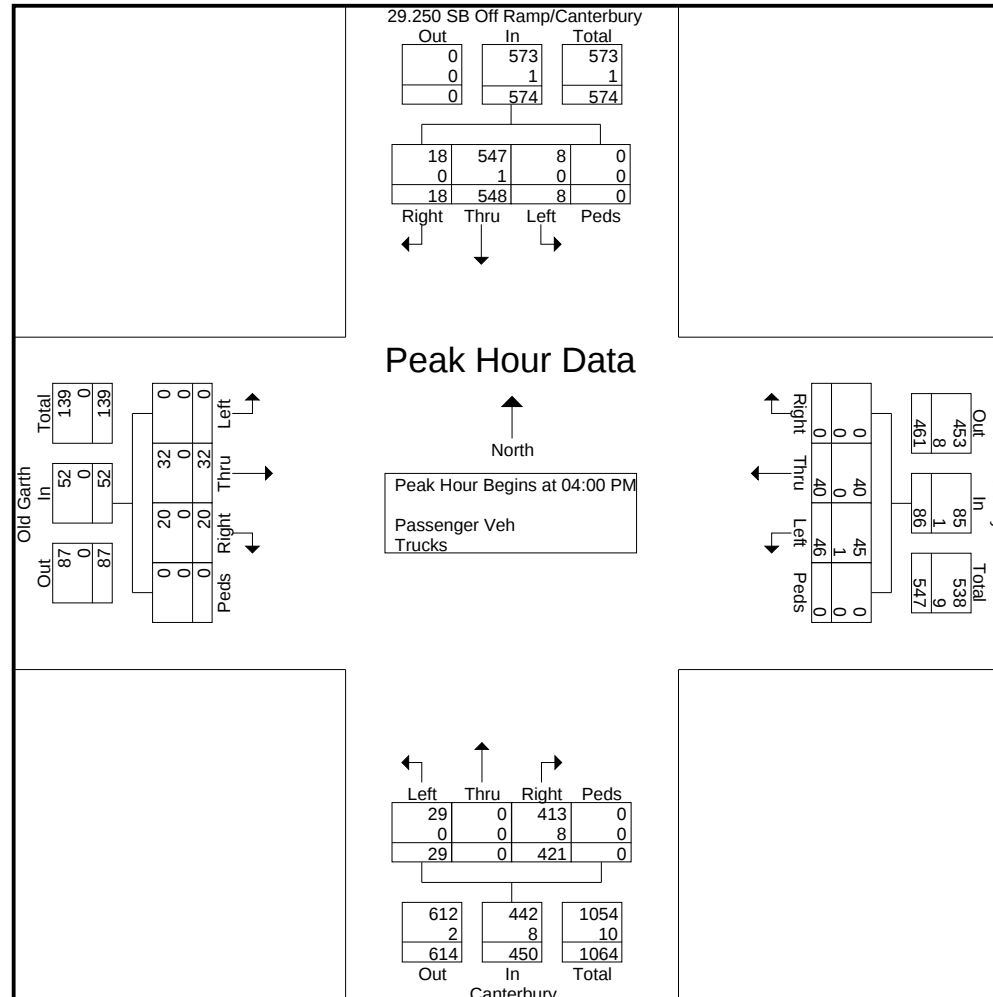
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File Name : Canterbury and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 5



# Data Collection Group

757.478.6761

LSmith@DataCollectionGroup.net

File Name : Old Ivy and Faulconer

Site Code : 00033668

Start Date : 5/6/2021

Page No : 1

## Groups Printed- Passenger Veh - Trucks

|                 | Faulconer<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|-----------------|-------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time      | Right                   | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| 07:00 AM        | 0                       | 1    | 8    | 0    | 9          | 2                    | 6    | 0    | 0    | 8          | 0                      | 0    | 0    | 0    | 0          | 0                    | 59   | 2    | 0    | 61         | 78         |
| 07:15 AM        | 0                       | 1    | 12   | 0    | 13         | 5                    | 7    | 0    | 0    | 12         | 0                      | 0    | 0    | 0    | 0          | 1                    | 82   | 7    | 0    | 90         | 115        |
| 07:30 AM        | 1                       | 0    | 7    | 0    | 8          | 10                   | 5    | 0    | 0    | 15         | 1                      | 0    | 0    | 0    | 1          | 3                    | 90   | 36   | 0    | 129        | 153        |
| 07:45 AM        | 0                       | 3    | 37   | 0    | 40         | 17                   | 6    | 0    | 0    | 23         | 0                      | 0    | 0    | 0    | 0          | 2                    | 87   | 51   | 0    | 140        | 203        |
| Total           | 1                       | 5    | 64   | 0    | 70         | 34                   | 24   | 0    | 0    | 58         | 1                      | 0    | 0    | 0    | 1          | 6                    | 318  | 96   | 0    | 420        | 549        |
| 08:00 AM        | 2                       | 1    | 57   | 0    | 60         | 22                   | 8    | 0    | 0    | 30         | 0                      | 0    | 0    | 0    | 0          | 2                    | 129  | 64   | 0    | 195        | 285        |
| 08:15 AM        | 0                       | 2    | 72   | 0    | 74         | 5                    | 15   | 0    | 0    | 20         | 0                      | 0    | 0    | 0    | 0          | 4                    | 97   | 30   | 0    | 131        | 225        |
| 08:30 AM        | 1                       | 1    | 32   | 0    | 34         | 5                    | 10   | 0    | 0    | 15         | 0                      | 0    | 3    | 0    | 3          | 3                    | 87   | 8    | 0    | 98         | 150        |
| 08:45 AM        | 1                       | 0    | 30   | 0    | 31         | 2                    | 4    | 0    | 0    | 6          | 0                      | 1    | 0    | 0    | 1          | 1                    | 113  | 4    | 0    | 118        | 156        |
| Total           | 4                       | 4    | 191  | 0    | 199        | 34                   | 37   | 0    | 0    | 71         | 0                      | 1    | 3    | 0    | 4          | 10                   | 426  | 106  | 0    | 542        | 816        |
| *** BREAK ***   |                         |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| 04:00 PM        | 1                       | 0    | 52   | 0    | 53         | 6                    | 12   | 1    | 0    | 19         | 3                      | 0    | 4    | 0    | 7          | 0                    | 101  | 12   | 0    | 113        | 192        |
| 04:15 PM        | 0                       | 0    | 45   | 0    | 45         | 3                    | 16   | 0    | 0    | 19         | 3                      | 0    | 0    | 0    | 3          | 2                    | 90   | 4    | 0    | 96         | 163        |
| 04:30 PM        | 2                       | 0    | 25   | 0    | 27         | 2                    | 32   | 0    | 1    | 35         | 2                      | 0    | 0    | 0    | 2          | 0                    | 115  | 4    | 0    | 119        | 183        |
| 04:45 PM        | 3                       | 0    | 23   | 0    | 26         | 5                    | 22   | 0    | 0    | 27         | 0                      | 0    | 1    | 0    | 1          | 1                    | 111  | 7    | 0    | 119        | 173        |
| Total           | 6                       | 0    | 145  | 0    | 151        | 16                   | 82   | 1    | 1    | 100        | 8                      | 0    | 5    | 0    | 13         | 3                    | 417  | 27   | 0    | 447        | 711        |
| 05:00 PM        | 6                       | 0    | 33   | 0    | 39         | 7                    | 19   | 0    | 0    | 26         | 3                      | 0    | 0    | 0    | 3          | 0                    | 93   | 6    | 0    | 99         | 167        |
| 05:15 PM        | 1                       | 0    | 42   | 0    | 43         | 4                    | 19   | 0    | 0    | 23         | 0                      | 0    | 0    | 1    | 1          | 0                    | 101  | 12   | 0    | 113        | 180        |
| 05:30 PM        | 1                       | 1    | 26   | 0    | 28         | 3                    | 11   | 0    | 0    | 14         | 1                      | 0    | 0    | 0    | 1          | 0                    | 104  | 4    | 0    | 108        | 151        |
| 05:45 PM        | 3                       | 0    | 33   | 0    | 36         | 6                    | 19   | 0    | 0    | 25         | 1                      | 0    | 0    | 0    | 1          | 0                    | 84   | 6    | 0    | 90         | 152        |
| Total           | 11                      | 1    | 134  | 0    | 146        | 20                   | 68   | 0    | 0    | 88         | 5                      | 0    | 0    | 1    | 6          | 0                    | 382  | 28   | 0    | 410        | 650        |
| Grand Total     | 22                      | 10   | 534  | 0    | 566        | 104                  | 211  | 1    | 1    | 317        | 14                     | 1    | 8    | 1    | 24         | 19                   | 1543 | 257  | 0    | 1819       | 2726       |
| Apprch %        | 3.9                     | 1.8  | 94.3 | 0    |            | 32.8                 | 66.6 | 0.3  | 0.3  |            | 58.3                   | 4.2  | 33.3 | 4.2  |            | 1                    | 84.8 | 14.1 | 0    |            |            |
| Total %         | 0.8                     | 0.4  | 19.6 | 0    | 20.8       | 3.8                  | 7.7  | 0    | 0    | 11.6       | 0.5                    | 0    | 0.3  | 0    | 0.9        | 0.7                  | 56.6 | 9.4  | 0    | 66.7       |            |
| Passenger Veh   | 22                      | 10   | 525  | 0    | 557        | 102                  | 204  | 0    | 1    | 307        | 14                     | 1    | 7    | 1    | 23         | 19                   | 1505 | 256  | 0    | 1780       | 2667       |
| % Passenger Veh | 100                     | 100  | 98.3 | 0    | 98.4       | 98.1                 | 96.7 | 0    | 100  | 96.8       | 100                    | 100  | 87.5 | 100  | 95.8       | 100                  | 97.5 | 99.6 | 0    | 97.9       | 97.8       |
| Trucks          | 0                       | 0    | 9    | 0    | 9          | 2                    | 7    | 1    | 0    | 10         | 0                      | 0    | 1    | 0    | 1          | 0                    | 38   | 1    | 0    | 39         | 59         |
| % Trucks        | 0                       | 0    | 1.7  | 0    | 1.6        | 1.9                  | 3.3  | 100  | 0    | 3.2        | 0                      | 0    | 12.5 | 0    | 4.2        | 0                    | 2.5  | 0.4  | 0    | 2.1        | 2.2        |

# Data Collection Group

757.478.6761

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File Name : Old Ivy and Faulconer

Site Code : 00033668

Start Date : 5/6/2021

Page No : 2

|                                                            | Faulconer<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|------------------------------------------------------------|-------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time                                                 | Right                   | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 |                         |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                         |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| 07:30 AM                                                   | 1                       | 0    | 7    | 0    | 8          | 10                   | 5    | 0    | 0    | 15         | 1                      | 0    | 0    | 0    | 1          | 3                    | 90   | 36   | 0    | 129        | 153        |
| 07:45 AM                                                   | 0                       | 3    | 37   | 0    | 40         | 17                   | 6    | 0    | 0    | 23         | 0                      | 0    | 0    | 0    | 0          | 2                    | 87   | 51   | 0    | 140        | 203        |
| 08:00 AM                                                   | 2                       | 1    | 57   | 0    | 60         | 22                   | 8    | 0    | 0    | 30         | 0                      | 0    | 0    | 0    | 0          | 2                    | 129  | 64   | 0    | 195        | 285        |
| 08:15 AM                                                   | 0                       | 2    | 72   | 0    | 74         | 5                    | 15   | 0    | 0    | 20         | 0                      | 0    | 0    | 0    | 0          | 4                    | 97   | 30   | 0    | 131        | 225        |
| Total Volume                                               | 3                       | 6    | 173  | 0    | 182        | 54                   | 34   | 0    | 0    | 88         | 1                      | 0    | 0    | 0    | 1          | 11                   | 403  | 181  | 0    | 595        | 866        |
| % App. Total                                               | 1.6                     | 3.3  | 95.1 | 0    |            | 61.4                 | 38.6 | 0    | 0    |            | 100                    | 0    | 0    | 0    |            | 1.8                  | 67.7 | 30.4 | 0    |            |            |
| PHF                                                        | .375                    | .500 | .601 | .000 | .615       | .614                 | .567 | .000 | .000 | .733       | .250                   | .000 | .000 | .000 | .250       | .688                 | .781 | .707 | .000 | .763       | .760       |
| Passenger Veh                                              | 3                       | 6    | 168  | 0    | 177        | 53                   | 32   | 0    | 0    | 85         | 1                      | 0    | 0    | 0    | 1          | 11                   | 393  | 181  | 0    | 585        | 848        |
| % Passenger Veh                                            | 100                     | 100  | 97.1 | 0    | 97.3       | 98.1                 | 94.1 | 0    | 0    | 96.6       | 100                    | 0    | 0    | 0    | 100        | 100                  | 97.5 | 100  | 0    | 98.3       | 97.9       |
| Trucks                                                     | 0                       | 0    | 5    | 0    | 5          | 1                    | 2    | 0    | 0    | 3          | 0                      | 0    | 0    | 0    | 0          | 0                    | 10   | 0    | 0    | 10         | 18         |
| % Trucks                                                   | 0                       | 0    | 2.9  | 0    | 2.7        | 1.9                  | 5.9  | 0    | 0    | 3.4        | 0                      | 0    | 0    | 0    | 0          | 0                    | 2.5  | 0    | 0    | 1.7        | 2.1        |

# Data Collection Group

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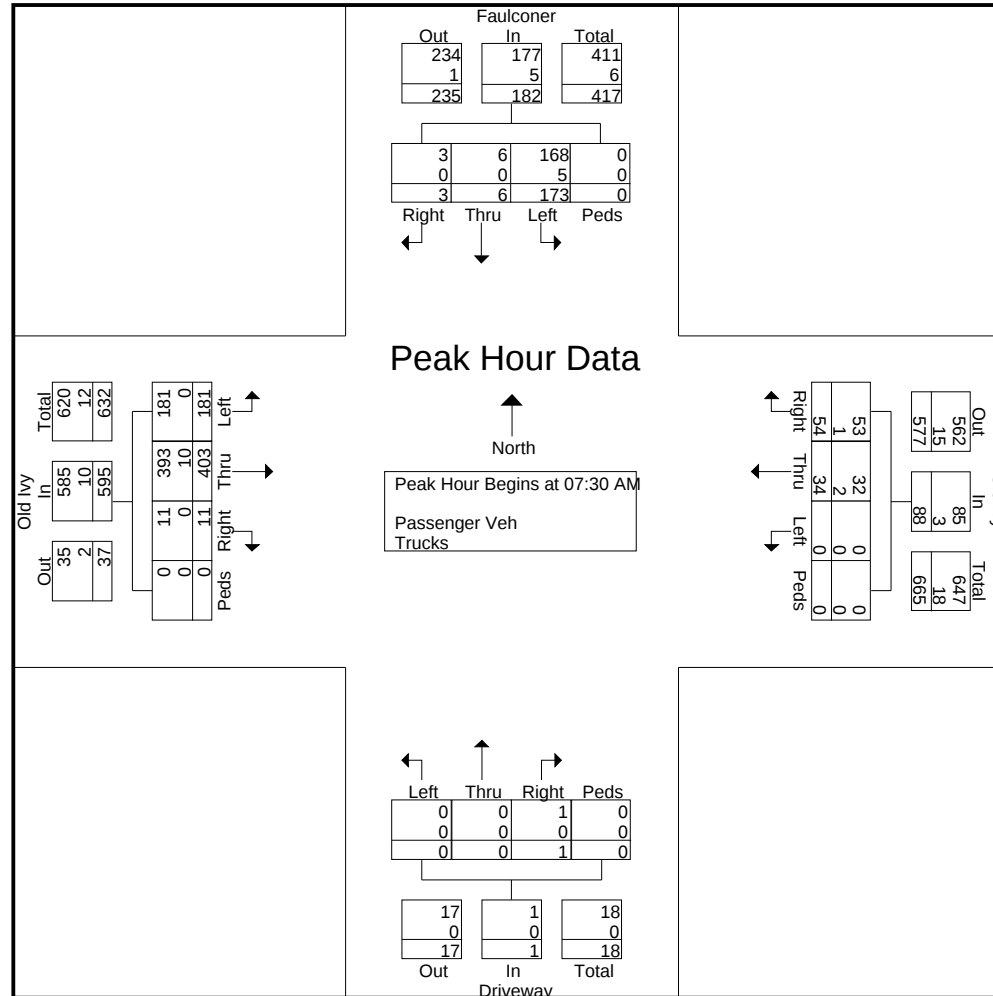
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File Name : Old Ivy and Faulconer

Site Code : 00033668

Start Date : 5/6/2021

Page No : 3



# Data Collection Group

757.478.6761

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File Name : Old Ivy and Faulconer

Site Code : 00033668

Start Date : 5/6/2021

Page No : 4

|                                                            | Faulconer<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|------------------------------------------------------------|-------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time                                                 | Right                   | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 |                         |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:00 PM       |                         |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| 04:00 PM                                                   | 1                       | 0    | 52   | 0    | 53         | 6                    | 12   | 1    | 0    | 19         | 3                      | 0    | 4    | 0    | 7          | 0                    | 101  | 12   | 0    | 113        | 192        |
| 04:15 PM                                                   | 0                       | 0    | 45   | 0    | 45         | 3                    | 16   | 0    | 0    | 19         | 3                      | 0    | 0    | 0    | 3          | 2                    | 90   | 4    | 0    | 96         | 163        |
| 04:30 PM                                                   | 2                       | 0    | 25   | 0    | 27         | 2                    | 32   | 0    | 1    | 35         | 2                      | 0    | 0    | 0    | 2          | 0                    | 115  | 4    | 0    | 119        | 183        |
| 04:45 PM                                                   | 3                       | 0    | 23   | 0    | 26         | 5                    | 22   | 0    | 0    | 27         | 0                      | 0    | 1    | 0    | 1          | 1                    | 111  | 7    | 0    | 119        | 173        |
| Total Volume                                               | 6                       | 0    | 145  | 0    | 151        | 16                   | 82   | 1    | 1    | 100        | 8                      | 0    | 5    | 0    | 13         | 3                    | 417  | 27   | 0    | 447        | 711        |
| % App. Total                                               | 4                       | 0    | 96   | 0    |            | 16                   | 82   | 1    | 1    |            | 61.5                   | 0    | 38.5 | 0    |            | 0.7                  | 93.3 | 6    | 0    |            |            |
| PHF                                                        | .500                    | .000 | .697 | .000 | .712       | .667                 | .641 | .250 | .250 | .714       | .667                   | .000 | .313 | .000 | .464       | .375                 | .907 | .563 | .000 | .939       | .926       |
| Passenger Veh                                              | 6                       | 0    | 145  | 0    | 151        | 15                   | 81   | 0    | 1    | 97         | 8                      | 0    | 4    | 0    | 12         | 3                    | 405  | 26   | 0    | 434        | 694        |
| % Passenger Veh                                            | 100                     | 0    | 100  | 0    | 100        | 93.8                 | 98.8 | 0    | 100  | 97.0       | 100                    | 0    | 80.0 | 0    | 92.3       | 100                  | 97.1 | 96.3 | 0    | 97.1       | 97.6       |
| Trucks                                                     | 0                       | 0    | 0    | 0    | 0          | 1                    | 1    | 1    | 0    | 3          | 0                      | 0    | 1    | 0    | 1          | 0                    | 12   | 1    | 0    | 13         | 17         |
| % Trucks                                                   | 0                       | 0    | 0    | 0    | 0          | 6.3                  | 1.2  | 100  | 0    | 3.0        | 0                      | 0    | 20.0 | 0    | 7.7        | 0                    | 2.9  | 3.7  | 0    | 2.9        | 2.4        |

# Data Collection Group

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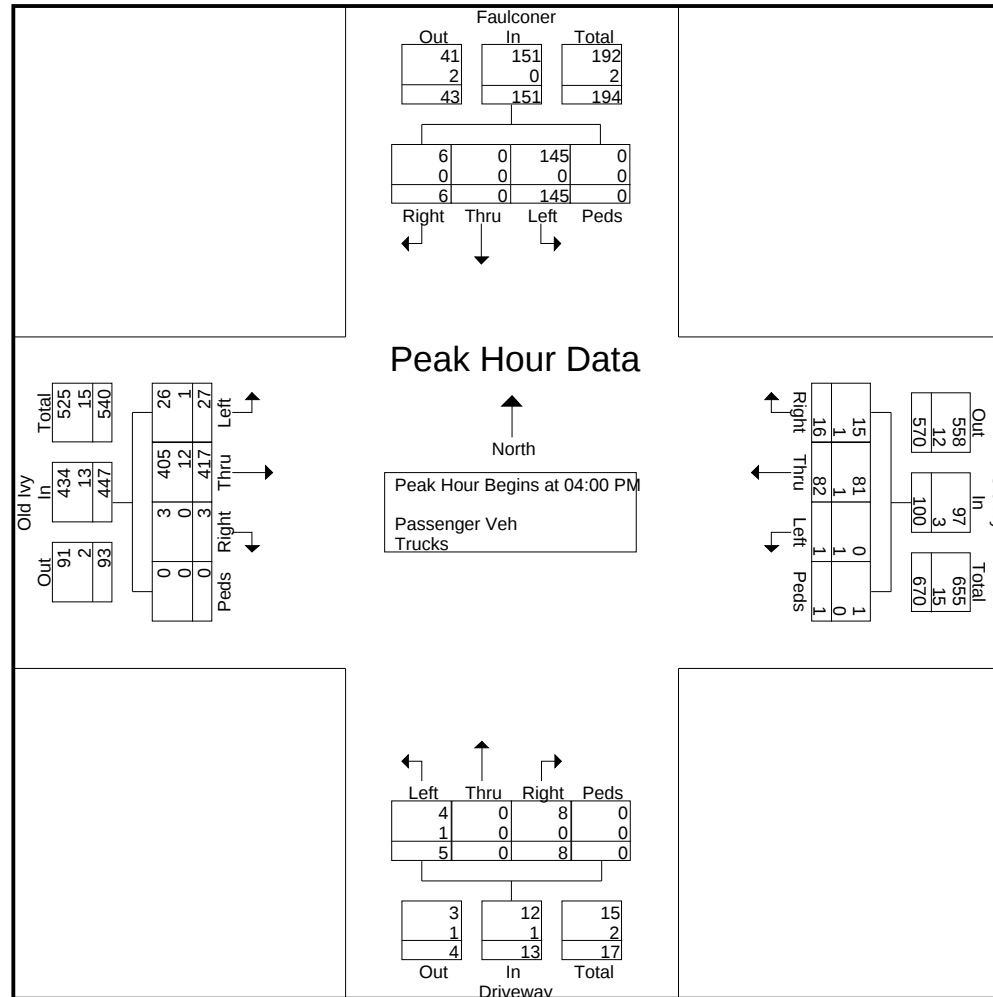
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File Name : Old Ivy and Faulconer

Site Code : 00033668

Start Date : 5/6/2021

Page No : 5



# Data Collection Group

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File Name : Old Ivy and 29-250 NB On Ramp

Site Code :

Start Date : 5/6/2021

Page No : 1

## Groups Printed- Passenger Veh - Trucks

|                 | 29/250 On Ramp<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|-----------------|------------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time      | Right                        | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| 07:00 AM        | 0                            | 0    | 0    | 0    | 0          | 9                    | 8    | 0    | 0    | 17         | 0                      | 0    | 0    | 0    | 0          | 2                    | 14   | 52   | 0    | 68         | 85         |
| 07:15 AM        | 0                            | 0    | 0    | 0    | 0          | 11                   | 12   | 0    | 0    | 23         | 0                      | 0    | 1    | 0    | 1          | 3                    | 21   | 64   | 0    | 88         | 112        |
| 07:30 AM        | 0                            | 0    | 0    | 0    | 0          | 6                    | 14   | 0    | 0    | 20         | 0                      | 0    | 0    | 0    | 0          | 0                    | 21   | 77   | 0    | 98         | 118        |
| 07:45 AM        | 0                            | 0    | 0    | 0    | 0          | 17                   | 23   | 0    | 0    | 40         | 0                      | 0    | 0    | 0    | 0          | 0                    | 38   | 78   | 0    | 116        | 156        |
| Total           | 0                            | 0    | 0    | 0    | 0          | 43                   | 57   | 0    | 0    | 100        | 0                      | 0    | 1    | 0    | 1          | 5                    | 94   | 271  | 0    | 370        | 471        |
| 08:00 AM        | 0                            | 0    | 0    | 0    | 0          | 21                   | 33   | 0    | 0    | 54         | 0                      | 0    | 0    | 0    | 0          | 1                    | 64   | 120  | 0    | 185        | 239        |
| 08:15 AM        | 0                            | 0    | 0    | 0    | 0          | 21                   | 20   | 0    | 0    | 41         | 0                      | 0    | 0    | 0    | 0          | 0                    | 70   | 104  | 0    | 174        | 215        |
| 08:30 AM        | 0                            | 0    | 0    | 0    | 0          | 24                   | 13   | 0    | 0    | 37         | 0                      | 0    | 0    | 0    | 0          | 0                    | 43   | 75   | 0    | 118        | 155        |
| 08:45 AM        | 0                            | 0    | 0    | 0    | 0          | 21                   | 6    | 0    | 0    | 27         | 0                      | 0    | 0    | 0    | 0          | 0                    | 59   | 84   | 0    | 143        | 170        |
| Total           | 0                            | 0    | 0    | 0    | 0          | 87                   | 72   | 0    | 0    | 159        | 0                      | 0    | 0    | 0    | 0          | 1                    | 236  | 383  | 0    | 620        | 779        |
| 04:00 PM        | 0                            | 0    | 0    | 0    | 0          | 56                   | 19   | 0    | 0    | 75         | 0                      | 0    | 0    | 0    | 0          | 0                    | 37   | 115  | 0    | 152        | 227        |
| 04:15 PM        | 0                            | 0    | 0    | 0    | 0          | 33                   | 17   | 0    | 0    | 50         | 0                      | 0    | 0    | 0    | 0          | 0                    | 38   | 102  | 0    | 140        | 190        |
| 04:30 PM        | 0                            | 0    | 0    | 0    | 0          | 46                   | 35   | 0    | 0    | 81         | 0                      | 0    | 0    | 1    | 1          | 0                    | 26   | 127  | 0    | 153        | 235        |
| 04:45 PM        | 0                            | 0    | 0    | 0    | 0          | 48                   | 29   | 0    | 0    | 77         | 0                      | 1    | 0    | 0    | 1          | 0                    | 26   | 109  | 0    | 135        | 213        |
| Total           | 0                            | 0    | 0    | 0    | 0          | 183                  | 100  | 0    | 0    | 283        | 0                      | 1    | 0    | 1    | 2          | 0                    | 127  | 453  | 0    | 580        | 865        |
| 05:00 PM        | 0                            | 0    | 0    | 0    | 0          | 64                   | 26   | 0    | 0    | 90         | 0                      | 0    | 0    | 0    | 0          | 0                    | 44   | 85   | 0    | 129        | 219        |
| 05:15 PM        | 0                            | 0    | 0    | 1    | 1          | 45                   | 24   | 0    | 0    | 69         | 0                      | 0    | 0    | 1    | 1          | 0                    | 45   | 95   | 0    | 140        | 211        |
| 05:30 PM        | 0                            | 0    | 0    | 0    | 0          | 49                   | 14   | 0    | 0    | 63         | 0                      | 0    | 0    | 0    | 0          | 1                    | 27   | 103  | 0    | 131        | 194        |
| 05:45 PM        | 0                            | 0    | 0    | 0    | 0          | 42                   | 24   | 0    | 0    | 66         | 0                      | 0    | 0    | 0    | 0          | 0                    | 38   | 80   | 0    | 118        | 184        |
| Total           | 0                            | 0    | 0    | 1    | 1          | 200                  | 88   | 0    | 0    | 288        | 0                      | 0    | 0    | 1    | 1          | 1                    | 154  | 363  | 0    | 518        | 808        |
| Grand Total     | 0                            | 0    | 0    | 1    | 1          | 513                  | 317  | 0    | 0    | 830        | 0                      | 1    | 1    | 2    | 4          | 7                    | 611  | 1470 | 0    | 2088       | 2923       |
| Apprch %        | 0                            | 0    | 0    | 100  |            | 61.8                 | 38.2 | 0    | 0    |            | 0                      | 25   | 25   | 50   |            | 0.3                  | 29.3 | 70.4 | 0    |            |            |
| Total %         | 0                            | 0    | 0    | 0    | 0          | 17.6                 | 10.8 | 0    | 0    | 28.4       | 0                      | 0    | 0    | 0.1  | 0.1        | 0.2                  | 20.9 | 50.3 | 0    | 71.4       |            |
| Passenger Veh   | 0                            | 0    | 0    | 1    | 1          | 508                  | 311  | 0    | 0    | 819        | 0                      | 1    | 0    | 2    | 3          | 6                    | 600  | 1445 | 0    | 2051       | 2874       |
| % Passenger Veh | 0                            | 0    | 0    | 100  | 100        | 99                   | 98.1 | 0    | 0    | 98.7       | 0                      | 100  | 0    | 100  | 75         | 85.7                 | 98.2 | 98.3 | 0    | 98.2       | 98.3       |
| Trucks          | 0                            | 0    | 0    | 0    | 0          | 5                    | 6    | 0    | 0    | 11         | 0                      | 0    | 1    | 0    | 1          | 1                    | 11   | 25   | 0    | 37         | 49         |
| % Trucks        | 0                            | 0    | 0    | 0    | 0          | 1                    | 1.9  | 0    | 0    | 1.3        | 0                      | 0    | 100  | 0    | 25         | 14.3                 | 1.8  | 1.7  | 0    | 1.8        | 1.7        |

# Data Collection Group

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File Name : Old Ivy and 29-250 NB On Ramp

Site Code :

Start Date : 5/6/2021

Page No : 2

|                                                            | 29/250 On Ramp<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|------------------------------------------------------------|------------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time                                                 | Right                        | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 |                              |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 08:00 AM       |                              |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| 08:00 AM                                                   | 0                            | 0    | 0    | 0    | 0          | 21                   | 33   | 0    | 0    | 54         | 0                      | 0    | 0    | 0    | 0          | 1                    | 64   | 120  | 0    | 185        | 239        |
| 08:15 AM                                                   | 0                            | 0    | 0    | 0    | 0          | 21                   | 20   | 0    | 0    | 41         | 0                      | 0    | 0    | 0    | 0          | 0                    | 70   | 104  | 0    | 174        | 215        |
| 08:30 AM                                                   | 0                            | 0    | 0    | 0    | 0          | 24                   | 13   | 0    | 0    | 37         | 0                      | 0    | 0    | 0    | 0          | 0                    | 43   | 75   | 0    | 118        | 155        |
| 08:45 AM                                                   | 0                            | 0    | 0    | 0    | 0          | 21                   | 6    | 0    | 0    | 27         | 0                      | 0    | 0    | 0    | 0          | 0                    | 59   | 84   | 0    | 143        | 170        |
| Total Volume                                               | 0                            | 0    | 0    | 0    | 0          | 87                   | 72   | 0    | 0    | 159        | 0                      | 0    | 0    | 0    | 0          | 1                    | 236  | 383  | 0    | 620        | 779        |
| % App. Total                                               | 0                            | 0    | 0    | 0    | 0          | 54.7                 | 45.3 | 0    | 0    |            | 0                      | 0    | 0    | 0    | 0          | 0.2                  | 38.1 | 61.8 | 0    |            |            |
| PHF                                                        | .000                         | .000 | .000 | .000 | .000       | .906                 | .545 | .000 | .000 | .736       | .000                   | .000 | .000 | .000 | .000       | .250                 | .843 | .798 | .000 | .838       | .815       |
| Passenger Veh                                              | 0                            | 0    | 0    | 0    | 0          | 86                   | 68   | 0    | 0    | 154        | 0                      | 0    | 0    | 0    | 0          | 1                    | 227  | 377  | 0    | 605        | 759        |
| % Passenger Veh                                            | 0                            | 0    | 0    | 0    | 0          | 98.9                 | 94.4 | 0    | 0    | 96.9       | 0                      | 0    | 0    | 0    | 0          | 100                  | 96.2 | 98.4 | 0    | 97.6       | 97.4       |
| Trucks                                                     | 0                            | 0    | 0    | 0    | 0          | 1                    | 4    | 0    | 0    | 5          | 0                      | 0    | 0    | 0    | 0          | 0                    | 9    | 6    | 0    | 15         | 20         |
| % Trucks                                                   | 0                            | 0    | 0    | 0    | 0          | 1.1                  | 5.6  | 0    | 0    | 3.1        | 0                      | 0    | 0    | 0    | 0          | 0                    | 3.8  | 1.6  | 0    | 2.4        | 2.6        |

# Data Collection Group

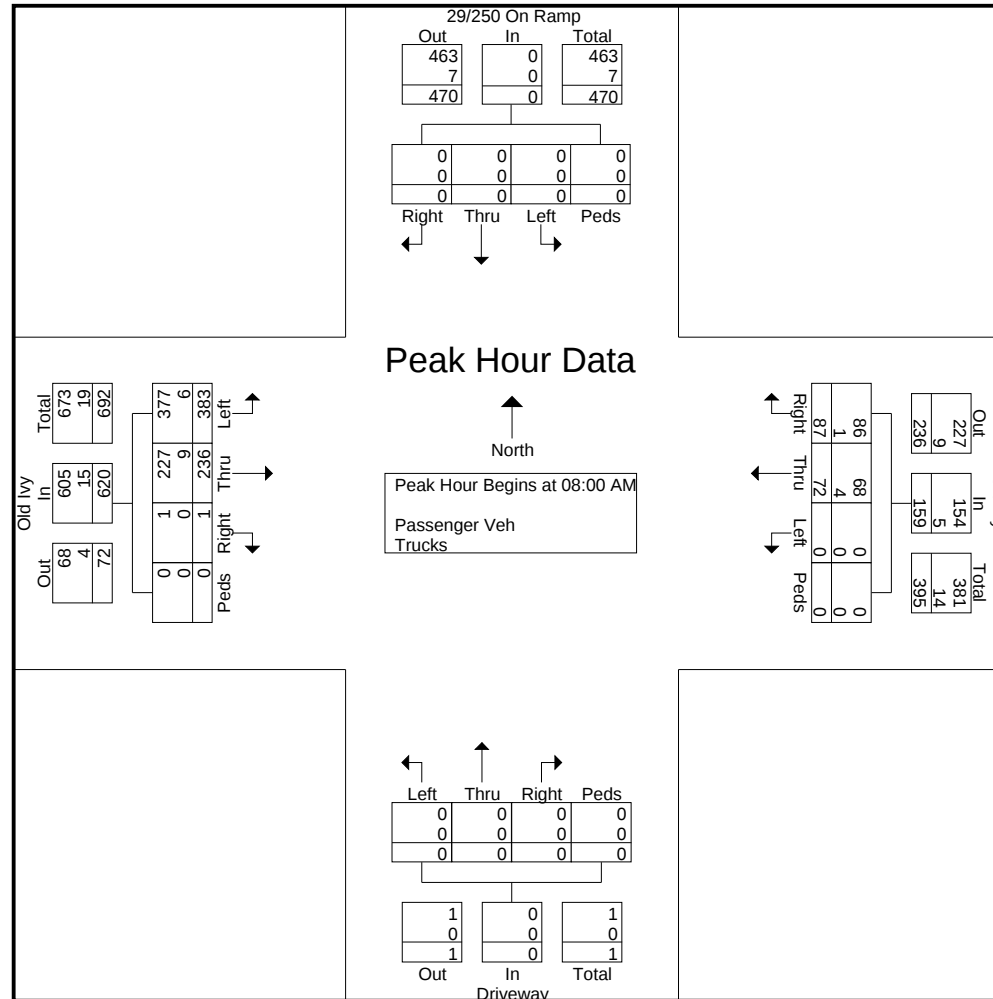
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File Name : Old Ivy and 29-250 NB On Ramp

Site Code :

Start Date : 5/6/2021

Page No : 3



# Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Old Ivy and 29-250 NB On Ramp

Site Code :

Start Date : 5/6/2021

Page No : 4

|                                                            | 29/250 On Ramp<br>From North |      |      |      |            | Old Ivy<br>From East |      |      |      |            | Driveway<br>From South |      |      |      |            | Old Ivy<br>From West |      |      |      |            |            |
|------------------------------------------------------------|------------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------------------|------|------|------|------------|----------------------|------|------|------|------------|------------|
| Start Time                                                 | Right                        | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Right                  | Thru | Left | Peds | App. Total | Right                | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 06:00 PM - Peak 1 of 1 |                              |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:30 PM       |                              |      |      |      |            |                      |      |      |      |            |                        |      |      |      |            |                      |      |      |      |            |            |
| 04:30 PM                                                   | 0                            | 0    | 0    | 0    | 0          | 46                   | 35   | 0    | 0    | 81         | 0                      | 0    | 0    | 1    | 1          | 0                    | 26   | 127  | 0    | 153        | 235        |
| 04:45 PM                                                   | 0                            | 0    | 0    | 0    | 0          | 48                   | 29   | 0    | 0    | 77         | 0                      | 1    | 0    | 0    | 1          | 0                    | 26   | 109  | 0    | 135        | 213        |
| 05:00 PM                                                   | 0                            | 0    | 0    | 0    | 0          | 64                   | 26   | 0    | 0    | 90         | 0                      | 0    | 0    | 0    | 0          | 0                    | 44   | 85   | 0    | 129        | 219        |
| 05:15 PM                                                   | 0                            | 0    | 0    | 1    | 1          | 45                   | 24   | 0    | 0    | 69         | 0                      | 0    | 0    | 1    | 1          | 0                    | 45   | 95   | 0    | 140        | 211        |
| Total Volume                                               | 0                            | 0    | 0    | 1    | 1          | 203                  | 114  | 0    | 0    | 317        | 0                      | 1    | 0    | 2    | 3          | 0                    | 141  | 416  | 0    | 557        | 878        |
| % App. Total                                               | 0                            | 0    | 0    | 100  |            | 64                   | 36   | 0    | 0    |            | 0                      | 33.3 | 0    | 66.7 |            | 0                    | 25.3 | 74.7 | 0    |            |            |
| PHF                                                        | .000                         | .000 | .000 | .250 | .250       | .793                 | .814 | .000 | .000 | .881       | .000                   | .250 | .000 | .500 | .750       | .000                 | .783 | .819 | .000 | .910       | .934       |
| Passenger Veh                                              | 0                            | 0    | 0    | 1    | 1          | 202                  | 113  | 0    | 0    | 315        | 0                      | 1    | 0    | 2    | 3          | 0                    | 141  | 408  | 0    | 549        | 868        |
| % Passenger Veh                                            | 0                            | 0    | 0    | 100  | 100        | 99.5                 | 99.1 | 0    | 0    | 99.4       | 0                      | 100  | 0    | 100  | 100        | 0                    | 100  | 98.1 | 0    | 98.6       | 98.9       |
| Trucks                                                     | 0                            | 0    | 0    | 0    | 0          | 1                    | 1    | 0    | 0    | 2          | 0                      | 0    | 0    | 0    | 0          | 0                    | 0    | 8    | 0    | 8          | 10         |
| % Trucks                                                   | 0                            | 0    | 0    | 0    | 0          | 0.5                  | 0.9  | 0    | 0    | 0.6        | 0                      | 0    | 0    | 0    | 0          | 0                    | 0    | 1.9  | 0    | 1.4        | 1.1        |

# Data Collection Group

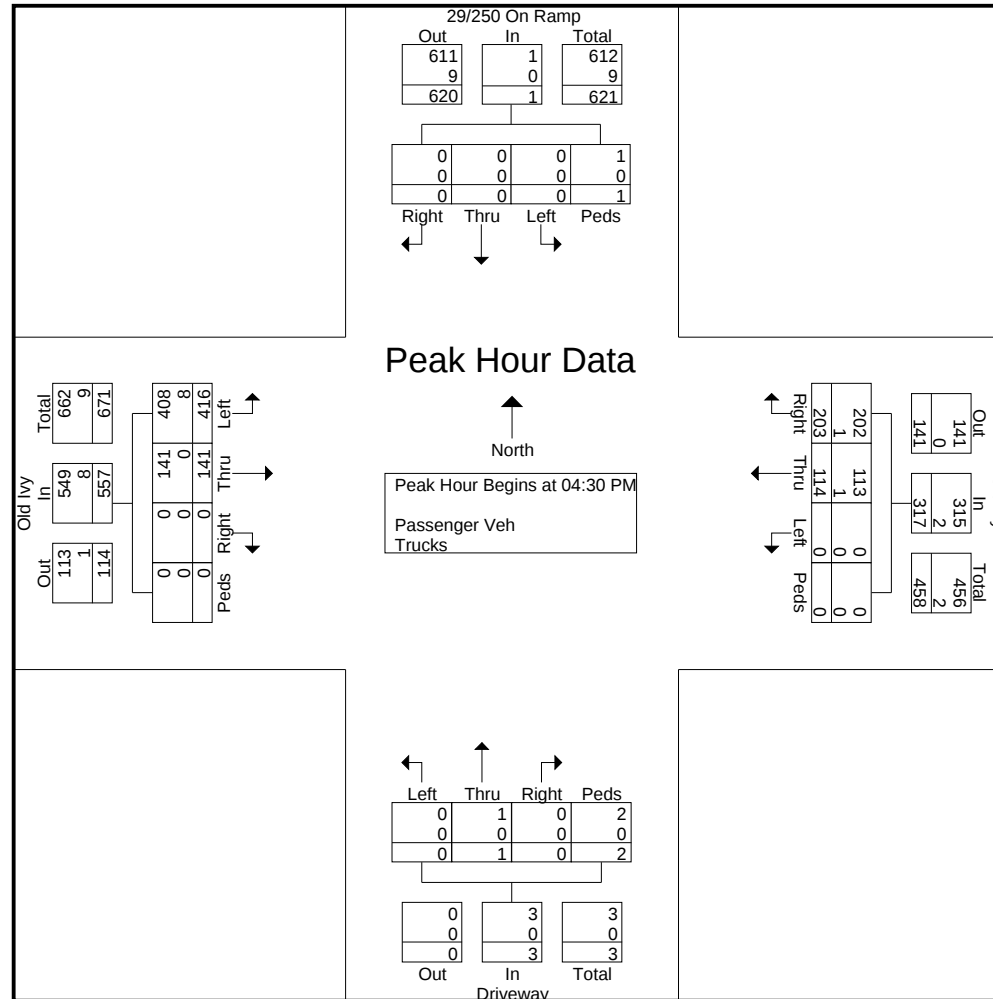
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File Name : Old Ivy and 29-250 NB On Ramp

Site Code :

Start Date : 5/6/2021

Page No : 5



# Data Collection Group

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File Name : Ivy and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 1

## Groups Printed- Passenger Veh - Trucks

|                 | Driveway<br>From North |       |      |      |      |            | Ivy<br>From East |               |      |      |      |            | Saint Annes<br>From South |      |           |      |      |            | Ivy<br>From West |      |      |           |      |            | Old Ivy<br>From Northwest |               |           |           |      |            |            |
|-----------------|------------------------|-------|------|------|------|------------|------------------|---------------|------|------|------|------------|---------------------------|------|-----------|------|------|------------|------------------|------|------|-----------|------|------------|---------------------------|---------------|-----------|-----------|------|------------|------------|
| Start Time      | Hard<br>Right          | Right | Thru | Left | Peds | App. Total | Right            | Bear<br>Right | Thru | Left | Peds | App. Total | Right                     | Thru | Bear Left | Left | Peds | App. Total | Right            | Thru | Left | Hard Left | Peds | App. Total | Hard<br>Right             | Bear<br>Right | Bear Left | Hard Left | Peds | App. Total | Int. Total |
| 07:00 AM        | 0                      | 0     | 0    | 1    | 0    | 1          | 0                | 10            | 33   | 0    | 0    | 43         | 1                         | 0    | 0         | 0    | 0    | 1          | 0                | 71   | 1    | 4         | 0    | 76         | 4                         | 0             | 8         | 0         | 0    | 12         | 133        |
| 07:15 AM        | 1                      | 0     | 0    | 0    | 0    | 1          | 0                | 13            | 51   | 0    | 0    | 64         | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 70   | 0    | 5         | 0    | 75         | 0                         | 0             | 19        | 0         | 0    | 19         | 159        |
| 07:30 AM        | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 20            | 55   | 0    | 0    | 75         | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 122  | 0    | 5         | 0    | 127        | 2                         | 0             | 15        | 0         | 0    | 17         | 220        |
| 07:45 AM        | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 39            | 57   | 0    | 0    | 96         | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 134  | 0    | 20        | 0    | 154        | 4                         | 0             | 29        | 0         | 0    | 33         | 283        |
| Total           | 1                      | 0     | 0    | 1    | 0    | 2          | 0                | 82            | 196  | 0    | 0    | 278        | 1                         | 0    | 0         | 1    | 0    | 2          | 0                | 397  | 1    | 34        | 0    | 432        | 10                        | 0             | 71        | 0         | 0    | 81         | 795        |
| 08:00 AM        | 1                      | 0     | 0    | 0    | 0    | 1          | 0                | 30            | 97   | 0    | 0    | 127        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 135  | 0    | 25        | 0    | 160        | 7                         | 0             | 34        | 2         | 0    | 43         | 331        |
| 08:15 AM        | 3                      | 0     | 0    | 0    | 0    | 3          | 0                | 28            | 56   | 0    | 0    | 84         | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 119  | 0    | 17        | 0    | 136        | 9                         | 0             | 54        | 1         | 0    | 64         | 288        |
| 08:30 AM        | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 34            | 69   | 0    | 0    | 103        | 0                         | 0    | 1         | 3    | 0    | 4          | 0                | 134  | 0    | 8         | 0    | 142        | 9                         | 0             | 33        | 0         | 0    | 42         | 291        |
| 08:45 AM        | 1                      | 0     | 0    | 0    | 0    | 1          | 0                | 25            | 70   | 0    | 0    | 95         | 0                         | 0    | 0         | 5    | 0    | 5          | 0                | 157  | 0    | 10        | 0    | 167        | 5                         | 0             | 38        | 2         | 0    | 45         | 313        |
| Total           | 5                      | 0     | 0    | 0    | 0    | 5          | 0                | 117           | 292  | 0    | 0    | 409        | 0                         | 0    | 1         | 9    | 0    | 10         | 0                | 545  | 0    | 60        | 0    | 605        | 30                        | 0             | 159       | 5         | 0    | 194        | 1223       |
|                 |                        |       |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| 04:00 PM        | 2                      | 0     | 0    | 0    | 1    | 3          | 0                | 55            | 136  | 0    | 0    | 191        | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 102  | 0    | 9         | 0    | 111        | 10                        | 0             | 36        | 2         | 0    | 48         | 354        |
| 04:15 PM        | 1                      | 1     | 0    | 0    | 1    | 3          | 0                | 52            | 136  | 0    | 0    | 188        | 1                         | 0    | 0         | 0    | 0    | 1          | 0                | 117  | 0    | 7         | 0    | 124        | 10                        | 0             | 26        | 2         | 0    | 38         | 354        |
| 04:30 PM        | 1                      | 1     | 0    | 0    | 4    | 6          | 0                | 60            | 122  | 0    | 0    | 182        | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 100  | 0    | 7         | 0    | 107        | 12                        | 0             | 30        | 4         | 0    | 46         | 342        |
| 04:45 PM        | 1                      | 1     | 0    | 0    | 0    | 2          | 1                | 64            | 137  | 0    | 0    | 202        | 0                         | 0    | 0         | 2    | 0    | 2          | 0                | 109  | 0    | 13        | 0    | 122        | 7                         | 0             | 27        | 3         | 0    | 37         | 365        |
| Total           | 5                      | 3     | 0    | 0    | 6    | 14         | 1                | 231           | 531  | 0    | 0    | 763        | 1                         | 0    | 0         | 4    | 0    | 5          | 0                | 428  | 0    | 36        | 0    | 464        | 39                        | 0             | 119       | 11        | 0    | 169        | 1415       |
| 05:00 PM        | 3                      | 1     | 0    | 1    | 1    | 6          | 0                | 65            | 163  | 0    | 0    | 228        | 3                         | 0    | 0         | 9    | 0    | 12         | 0                | 119  | 0    | 9         | 0    | 128        | 14                        | 0             | 29        | 1         | 0    | 44         | 418        |
| 05:15 PM        | 1                      | 1     | 0    | 0    | 0    | 2          | 0                | 48            | 181  | 0    | 0    | 229        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 103  | 0    | 7         | 0    | 110        | 11                        | 0             | 26        | 1         | 0    | 38         | 379        |
| 05:30 PM        | 1                      | 0     | 0    | 0    | 1    | 2          | 0                | 50            | 126  | 0    | 0    | 176        | 0                         | 0    | 0         | 2    | 0    | 2          | 0                | 93   | 0    | 6         | 0    | 99         | 6                         | 0             | 25        | 2         | 0    | 33         | 312        |
| 05:45 PM        | 0                      | 2     | 0    | 0    | 0    | 2          | 0                | 52            | 109  | 0    | 0    | 161        | 0                         | 0    | 0         | 4    | 0    | 4          | 0                | 86   | 1    | 6         | 0    | 93         | 6                         | 0             | 14        | 3         | 0    | 23         | 283        |
| Total           | 5                      | 4     | 0    | 1    | 2    | 12         | 0                | 215           | 579  | 0    | 0    | 794        | 3                         | 0    | 0         | 15   | 0    | 18         | 0                | 401  | 1    | 28        | 0    | 430        | 37                        | 0             | 94        | 7         | 0    | 138        | 1392       |
| Grand Total     | 16                     | 7     | 0    | 2    | 8    | 33         | 1                | 645           | 1598 | 0    | 0    | 2244       | 5                         | 0    | 1         | 29   | 0    | 35         | 0                | 1771 | 2    | 158       | 0    | 1931       | 116                       | 0             | 443       | 23        | 0    | 582        | 4825       |
| Apprch %        | 48.5                   | 21.2  | 0    | 6.1  | 24.2 |            | 0                | 28.7          | 71.2 | 0    | 0    |            | 14.3                      | 0    | 2.9       | 82.9 | 0    |            | 0                | 91.7 | 0.1  | 8.2       | 0    |            | 19.9                      | 0             | 76.1      | 4         | 0    |            |            |
| Total %         | 0.3                    | 0.1   | 0    | 0    | 0.2  | 0.7        | 0                | 13.4          | 33.1 | 0    | 0    | 46.5       | 0.1                       | 0    | 0         | 0.6  | 0    | 0.7        | 0                | 36.7 | 0    | 3.3       | 0    | 40         | 2.4                       | 0             | 9.2       | 0.5       | 0    | 12.1       |            |
| Passenger Veh   |                        |       |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| % Passenger Veh | 100                    | 100   | 0    | 100  | 100  | 100        | 100              | 98.3          | 97.5 | 0    | 0    | 97.7       | 100                       | 0    | 100       | 100  | 0    | 100        | 0                | 98.2 | 100  | 100       | 0    | 98.4       | 100                       | 0             | 98        | 100       | 0    | 98.5       | 98.1       |
| Trucks          | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 11            | 40   | 0    | 0    | 51         | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 31   | 0    | 0         | 0    | 31         | 0                         | 0             | 9         | 0         | 0    | 9          | 91         |
| % Trucks        | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 1.7           | 2.5  | 0    | 0    | 2.3        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 1.8  | 0    | 0         | 0    | 1.6        | 0                         | 0             | 2         | 0         | 0    | 1.5        | 1.9        |

# Data Collection Group

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File Name : Ivy and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 2

|                                                            | Driveway<br>From North |       |      |      |      |            | Ivy<br>From East |               |      |      |      |            | Saint Annes<br>From South |      |           |      |      |            | Ivy<br>From West |      |      |           |      |            | Old Ivy<br>From Northwest |               |           |           |      |            |            |
|------------------------------------------------------------|------------------------|-------|------|------|------|------------|------------------|---------------|------|------|------|------------|---------------------------|------|-----------|------|------|------------|------------------|------|------|-----------|------|------------|---------------------------|---------------|-----------|-----------|------|------------|------------|
| Start Time                                                 | Hard<br>Right          | Right | Thru | Left | Peds | App. Total | Right            | Bear<br>Right | Thru | Left | Peds | App. Total | Right                     | Thru | Bear Left | Left | Peds | App. Total | Right            | Thru | Left | Hard Left | Peds | App. Total | Hard<br>Right             | Bear<br>Right | Bear Left | Hard Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1 |                        |       |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| Peak Hour for Entire Intersection Begins at 08:00 AM       |                        |       |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| 08:00 AM                                                   | 1                      | 0     | 0    | 0    | 0    | 1          | 0                | 30            | 97   | 0    | 0    | 127        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 135  | 0    | 25        | 0    | 160        | 7                         | 0             | 34        | 2         | 0    | 43         | 331        |
| 08:15 AM                                                   | 3                      | 0     | 0    | 0    | 0    | 3          | 0                | 28            | 56   | 0    | 0    | 84         | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 119  | 0    | 17        | 0    | 136        | 9                         | 0             | 54        | 1         | 0    | 64         | 288        |
| 08:30 AM                                                   | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 34            | 69   | 0    | 0    | 103        | 0                         | 0    | 1         | 3    | 0    | 4          | 0                | 134  | 0    | 8         | 0    | 142        | 9                         | 0             | 33        | 0         | 0    | 42         | 291        |
| 08:45 AM                                                   | 1                      | 0     | 0    | 0    | 0    | 1          | 0                | 25            | 70   | 0    | 0    | 95         | 0                         | 0    | 0         | 5    | 0    | 5          | 0                | 157  | 0    | 10        | 0    | 167        | 5                         | 0             | 38        | 2         | 0    | 45         | 313        |
| Total Volume                                               | 5                      | 0     | 0    | 0    | 0    | 5          | 0                | 117           | 292  | 0    | 0    | 409        | 0                         | 0    | 1         | 9    | 0    | 10         | 0                | 545  | 0    | 60        | 0    | 605        | 30                        | 0             | 159       | 5         | 0    | 194        | 1223       |
| % App. Total                                               | 100                    | 0     | 0    | 0    | 0    |            | 0                | 28.6          | 71.4 | 0    | 0    |            | 0                         | 0    | 10        | 90   | 0    |            | 0                | 90.1 | 0    | 9.9       | 0    |            | 15.5                      | 0             | 82        | 2.6       | 0    |            |            |
| PHF                                                        | .417                   | .000  | .000 | .000 | .000 | .417       | .000             | .860          | .753 | .000 | .000 | .805       | .000                      | .000 | .250      | .450 | .000 | .500       | .000             | .868 | .000 | .600      | .000 | .906       | .833                      | .000          | .736      | .625      | .000 | .758       | .924       |
| Passenger Veh                                              | 5                      | 0     | 0    | 0    | 0    | 5          | 0                | 112           | 282  | 0    | 0    | 394        | 0                         | 0    | 1         | 9    | 0    | 10         | 0                | 537  | 0    | 60        | 0    | 597        | 30                        | 0             | 152       | 5         | 0    | 187        | 1193       |
| % Passenger Veh                                            | 100                    | 0     | 0    | 0    | 0    | 100        | 0                | 95.7          | 96.6 | 0    | 0    | 96.3       | 0                         | 0    | 100       | 100  | 0    | 100        | 0                | 98.5 | 0    | 100       | 0    | 98.7       | 100                       | 0             | 95.6      | 100       | 0    | 96.4       | 97.5       |
| Trucks                                                     | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 5             | 10   | 0    | 0    | 15         | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 8    | 0    | 0         | 0    | 8          | 0                         | 0             | 7         | 0         | 0    | 7          | 30         |
| % Trucks                                                   | 0                      | 0     | 0    | 0    | 0    | 0          | 0                | 4.3           | 3.4  | 0    | 0    | 3.7        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 1.5  | 0    | 0         | 0    | 1.3        | 0                         | 0             | 4.4       | 0         | 0    | 3.6        | 2.5        |

# Data Collection Group

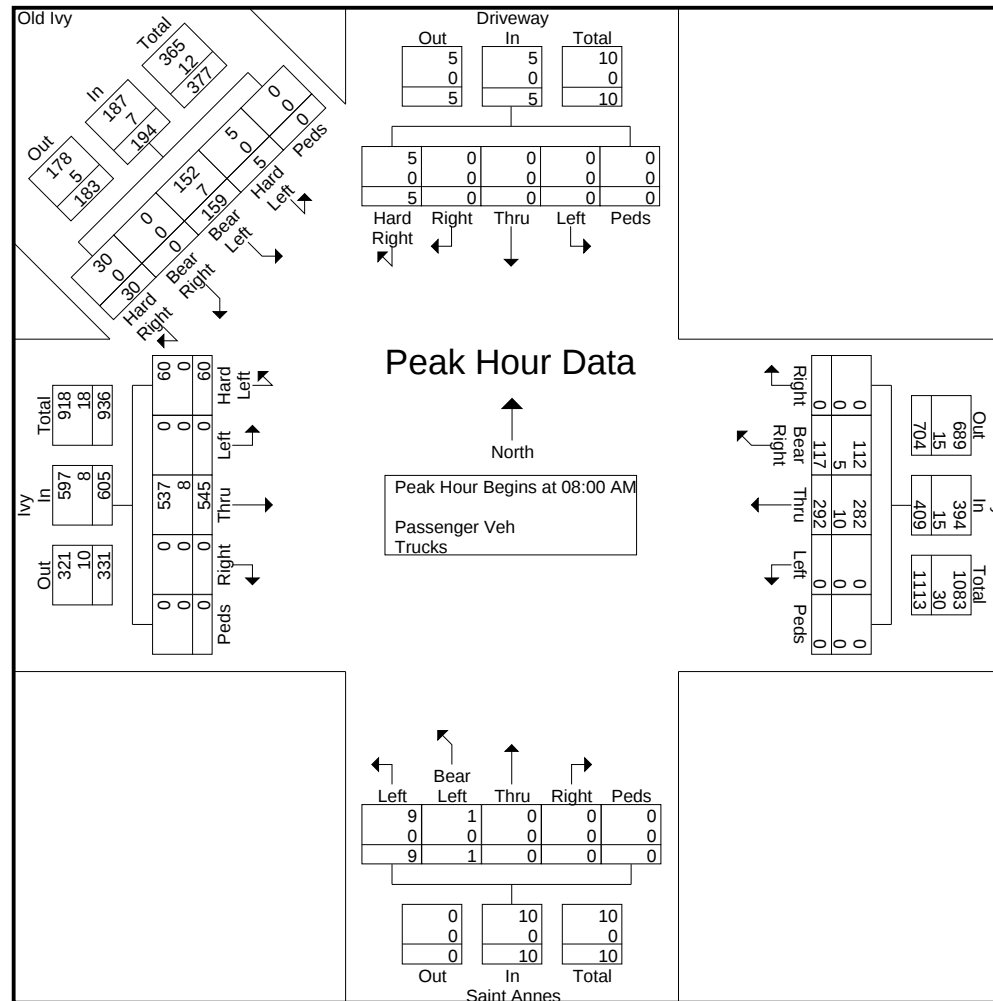
LSmith@DataCollectionGroup.net

File Name : Ivy and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 3



# Data Collection Group

LSmith@DataCollectionGroup.net

File Name : Ivy and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 4

|                                                            | Driveway<br>From North |          |      |      |      |            | Ivy<br>From East |               |      |      |      |            | Saint Annes<br>From South |      |           |      |      |            | Ivy<br>From West |      |      |           |      |            | Old Ivy<br>From Northwest |               |           |           |      |            |            |
|------------------------------------------------------------|------------------------|----------|------|------|------|------------|------------------|---------------|------|------|------|------------|---------------------------|------|-----------|------|------|------------|------------------|------|------|-----------|------|------------|---------------------------|---------------|-----------|-----------|------|------------|------------|
| Start Time                                                 | Hard<br>Right          | Right    | Thru | Left | Peds | App. Total | Right            | Bear<br>Right | Thru | Left | Peds | App. Total | Right                     | Thru | Bear Left | Left | Peds | App. Total | Right            | Thru | Left | Hard Left | Peds | App. Total | Hard<br>Right             | Bear<br>Right | Bear Left | Hard Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 |                        |          |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| Peak Hour for Entire Intersection Begins at 04:30 PM       |                        |          |      |      |      |            |                  |               |      |      |      |            |                           |      |           |      |      |            |                  |      |      |           |      |            |                           |               |           |           |      |            |            |
| 04:30 PM                                                   | 1                      | 1        | 0    | 0    | 4    | 6          | 0                | 60            | 122  | 0    | 0    | 182        | 0                         | 0    | 0         | 1    | 0    | 1          | 0                | 100  | 0    | 7         | 0    | 107        | 12                        | 0             | 30        | 4         | 0    | 46         | 342        |
| 04:45 PM                                                   | 1                      | 1        | 0    | 0    | 0    | 2          | 1                | 64            | 137  | 0    | 0    | 202        | 0                         | 0    | 0         | 2    | 0    | 2          | 0                | 109  | 0    | 13        | 0    | 122        | 7                         | 0             | 27        | 3         | 0    | 37         | 365        |
| 05:00 PM                                                   | 3                      | 1        | 0    | 1    | 1    | 6          | 0                | 65            | 163  | 0    | 0    | 228        | 3                         | 0    | 0         | 9    | 0    | 12         | 0                | 119  | 0    | 9         | 0    | 128        | 14                        | 0             | 29        | 1         | 0    | 44         | 418        |
| 05:15 PM                                                   | 1                      | 1        | 0    | 0    | 0    | 2          | 0                | 48            | 181  | 0    | 0    | 229        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 103  | 0    | 7         | 0    | 110        | 11                        | 0             | 26        | 1         | 0    | 38         | 379        |
| Total Volume                                               | 6                      | 4        | 0    | 1    | 5    | 16         | 1                | 237           | 603  | 0    | 0    | 841        | 3                         | 0    | 0         | 12   | 0    | 15         | 0                | 431  | 0    | 36        | 0    | 467        | 44                        | 0             | 112       | 9         | 0    | 165        | 1504       |
| % App. Total                                               | 37.5                   | 25       | 0    | 6.2  | 31.2 |            | 0.1              | 28.2          | 71.7 | 0    | 0    |            | 20                        | 0    | 0         | 80   | 0    |            | 0                | 92.3 | 0    | 7.7       | 0    |            | 26.7                      | 0             | 67.9      | 5.5       | 0    |            |            |
| PHF                                                        | .500                   | 1.0<br>0 | .000 | .250 | .313 | .667       | .250             | .912          | .833 | .000 | .000 | .918       | .250                      | .000 | .000      | .333 | .000 | .313       | .000             | .905 | .000 | .692      | .000 | .912       | .786                      | .000          | .933      | .563      | .000 | .897       | .900       |
| Passenger Veh                                              | 6                      | 4        | 0    | 1    | 5    | 16         | 1                | 235           | 597  | 0    | 0    | 833        | 3                         | 0    | 0         | 12   | 0    | 15         | 0                | 424  | 0    | 36        | 0    | 460        | 44                        | 0             | 112       | 9         | 0    | 165        | 1489       |
| % Passenger Veh                                            | 100                    | 100      | 0    | 100  | 100  | 100        | 100              | 99.2          | 99.0 | 0    | 0    | 99.0       | 100                       | 0    | 0         | 100  | 0    | 100        | 0                | 98.4 | 0    | 100       | 0    | 98.5       | 100                       | 0             | 100       | 100       | 0    | 100        | 99.0       |
| Trucks                                                     | 0                      | 0        | 0    | 0    | 0    | 0          | 0                | 2             | 6    | 0    | 0    | 8          | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 7    | 0    | 0         | 0    | 7          | 0                         | 0             | 0         | 0         | 0    | 0          | 15         |
| % Trucks                                                   | 0                      | 0        | 0    | 0    | 0    | 0          | 0                | 0.8           | 1.0  | 0    | 0    | 1.0        | 0                         | 0    | 0         | 0    | 0    | 0          | 0                | 1.6  | 0    | 0         | 0    | 1.5        | 0                         | 0             | 0         | 0         | 0    | 0          | 1.0        |

# Data Collection Group

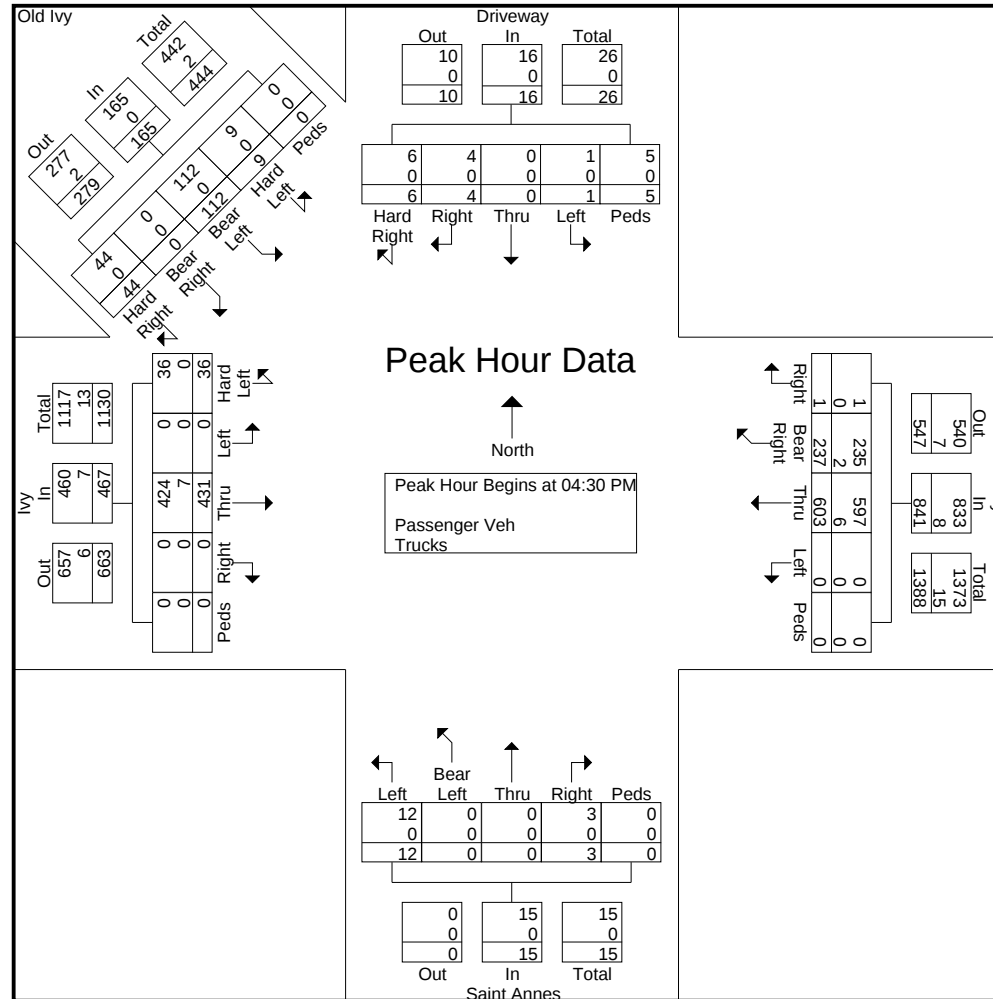
LSmith@DataCollectionGroup.net

File Name : Ivy and Old Ivy

Site Code :

Start Date : 5/6/2021

Page No : 5





## **Appendix B**

# **Synchro Analysis for 2021 Existing Conditions**

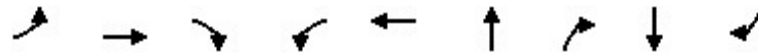
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# Queues

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 412  | 656  | 11   | 27   | 709  | 33   | 26   | 100  | 600  |
| v/c Ratio               | 0.91 | 0.56 | 0.01 | 0.06 | 0.96 | 0.26 | 0.08 | 0.64 | 0.92 |
| Control Delay           | 58.1 | 18.0 | 0.0  | 11.0 | 60.1 | 58.6 | 0.5  | 70.6 | 40.5 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 58.1 | 18.0 | 0.0  | 11.0 | 60.1 | 58.6 | 0.5  | 70.6 | 40.5 |
| Queue Length 50th (ft)  | 251  | 341  | 0    | 6    | ~613 | 25   | 0    | 76   | 188  |
| Queue Length 95th (ft)  | #460 | 477  | 0    | 17   | #850 | 59   | 0    | 132  | #440 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 467  | 1164 | 1075 | 421  | 740  | 147  | 338  | 199  | 662  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.88 | 0.56 | 0.01 | 0.06 | 0.96 | 0.22 | 0.08 | 0.50 | 0.91 |

### Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 375                                                                               | 597                                                                               | 10                                                                                | 25                                                                                | 543                                                                               | 102                                                                               | 12                                                                                 | 18                                                                                  | 24                                                                                  | 78                                                                                  | 13                                                                                  | 546                                                                                 |
| Future Volume (vph)               | 375                                                                               | 597                                                                               | 10                                                                                | 25                                                                                | 543                                                                               | 102                                                                               | 12                                                                                 | 18                                                                                  | 24                                                                                  | 78                                                                                  | 13                                                                                  | 546                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1770                                                                              | 1845                                                                              | 1615                                                                              | 1736                                                                              | 1760                                                                              |                                                                                   |                                                                                    | 1863                                                                                | 1538                                                                                |                                                                                     | 1761                                                                                | 1553                                                                                |
| Flt Permitted                     | 0.07                                                                              | 1.00                                                                              | 1.00                                                                              | 0.42                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 136                                                                               | 1845                                                                              | 1615                                                                              | 759                                                                               | 1760                                                                              |                                                                                   |                                                                                    | 1863                                                                                | 1538                                                                                |                                                                                     | 1761                                                                                | 1553                                                                                |
| Peak-hour factor, PHF             | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                               | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                | 0.91                                                                                |
| Adj. Flow (vph)                   | 412                                                                               | 656                                                                               | 11                                                                                | 27                                                                                | 597                                                                               | 112                                                                               | 13                                                                                 | 20                                                                                  | 26                                                                                  | 86                                                                                  | 14                                                                                  | 600                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 25                                                                                  | 0                                                                                   | 0                                                                                   | 181                                                                                 |
| Lane Group Flow (vph)             | 412                                                                               | 656                                                                               | 7                                                                                 | 27                                                                                | 704                                                                               | 0                                                                                 | 0                                                                                  | 33                                                                                  | 1                                                                                   | 0                                                                                   | 100                                                                                 | 419                                                                                 |
| Heavy Vehicles (%)                | 2%                                                                                | 3%                                                                                | 0%                                                                                | 4%                                                                                | 6%                                                                                | 2%                                                                                | 0%                                                                                 | 0%                                                                                  | 5%                                                                                  | 4%                                                                                  | 0%                                                                                  | 4%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                              | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 83.1                                                                              | 71.3                                                                              | 71.3                                                                              | 52.9                                                                              | 48.9                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 10.7                                                                                | 37.1                                                                                |
| Effective Green, g (s)            | 83.1                                                                              | 71.3                                                                              | 71.3                                                                              | 52.9                                                                              | 48.9                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 10.7                                                                                | 37.1                                                                                |
| Actuated g/C Ratio                | 0.69                                                                              | 0.59                                                                              | 0.59                                                                              | 0.44                                                                              | 0.41                                                                              |                                                                                   |                                                                                    | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.09                                                                                | 0.31                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 453                                                                               | 1096                                                                              | 959                                                                               | 367                                                                               | 717                                                                               |                                                                                   |                                                                                    | 100                                                                                 | 83                                                                                  |                                                                                     | 157                                                                                 | 480                                                                                 |
| v/s Ratio Prot                    | c0.20                                                                             | 0.36                                                                              |                                                                                   | 0.00                                                                              | c0.40                                                                             |                                                                                   |                                                                                    | c0.02                                                                               |                                                                                     |                                                                                     | 0.06                                                                                | c0.19                                                                               |
| v/s Ratio Perm                    | 0.43                                                                              |                                                                                   | 0.00                                                                              | 0.03                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.91                                                                              | 0.60                                                                              | 0.01                                                                              | 0.07                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 0.33                                                                                | 0.02                                                                                |                                                                                     | 0.64                                                                                | 0.87                                                                                |
| Uniform Delay, d1                 | 37.0                                                                              | 15.3                                                                              | 9.9                                                                               | 19.1                                                                              | 35.1                                                                              |                                                                                   |                                                                                    | 54.7                                                                                | 53.7                                                                                |                                                                                     | 52.8                                                                                | 39.2                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 21.4                                                                              | 2.4                                                                               | 0.0                                                                               | 0.0                                                                               | 29.4                                                                              |                                                                                   |                                                                                    | 0.7                                                                                 | 0.0                                                                                 |                                                                                     | 6.1                                                                                 | 15.5                                                                                |
| Delay (s)                         | 58.4                                                                              | 17.8                                                                              | 9.9                                                                               | 19.1                                                                              | 64.5                                                                              |                                                                                   |                                                                                    | 55.4                                                                                | 53.8                                                                                |                                                                                     | 58.9                                                                                | 54.7                                                                                |
| Level of Service                  | E                                                                                 | B                                                                                 | A                                                                                 | B                                                                                 | E                                                                                 |                                                                                   |                                                                                    | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   |
| Approach Delay (s)                |                                                                                   | 33.2                                                                              |                                                                                   |                                                                                   | 62.8                                                                              |                                                                                   |                                                                                    | 54.7                                                                                |                                                                                     |                                                                                     | 55.3                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 48.2                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.91                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 93.7%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 65                                                                                | 33                                                                                | 31                                                                                | 17                                                                                | 0                                                                                 | 20                                                                                  | 0                                                                                   | 474                                                                                 | 52                                                                                  | 583                                                                                 | 39                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 65                                                                                | 33                                                                                | 31                                                                                | 17                                                                                | 0                                                                                 | 20                                                                                  | 0                                                                                   | 474                                                                                 | 52                                                                                  | 583                                                                                 | 39                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              | 0.85                                                                                | 0.85                                                                                | 0.85                                                                                | 0.85                                                                                | 0.85                                                                                | 0.85                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 76                                                                                | 39                                                                                | 36                                                                                | 20                                                                                | 0                                                                                 | 24                                                                                  | 0                                                                                   | 558                                                                                 | 61                                                                                  | 686                                                                                 | 46                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.88                                                                              | 0.88                                                                              |                                                                                   | 0.88                                                                              | 0.88                                                                              | 0.88                                                                              |                                                                                     |                                                                                     |                                                                                     | 0.88                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1168                                                                              | 1437                                                                              | 709                                                                               | 1235                                                                              | 1181                                                                              | 279                                                                               | 732                                                                                 |                                                                                     |                                                                                     | 558                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1121                                                                              | 1428                                                                              | 709                                                                               | 1198                                                                              | 1136                                                                              | 108                                                                               | 732                                                                                 |                                                                                     |                                                                                     | 426                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.2                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.6                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 30                                                                                | 91                                                                                | 30                                                                                | 88                                                                                | 100                                                                               | 97                                                                                  |                                                                                     |                                                                                     | 94                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 137                                                                               | 109                                                                               | 438                                                                               | 51                                                                                | 163                                                                               | 834                                                                               | 882                                                                                 |                                                                                     |                                                                                     | 1004                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 115                                                                               | 56                                                                                | 582                                                                               | 793                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 36                                                                                | 24                                                                                | 61                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 39                                                                                | 0                                                                                 | 558                                                                               | 46                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 146                                                                               | 68                                                                                | 882                                                                               | 1004                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.79                                                                              | 0.82                                                                              | 0.03                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 122                                                                               | 97                                                                                | 2                                                                                 | 5                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 86.3                                                                              | 164.3                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 86.3                                                                              | 164.3                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 13.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 69.4%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (veh/h)            | 117                                                                               | 469                                                                               | 11                                                                                | 0                                                                                 | 41                                                                                | 37                                                                                | 3                                                                                   | 1                                                                                   | 0                                                                                   | 210                                                                                 | 4                                                                                   | 4                                                                                   |
| Future Volume (Veh/h)             | 117                                                                               | 469                                                                               | 11                                                                                | 0                                                                                 | 41                                                                                | 37                                                                                | 3                                                                                   | 1                                                                                   | 0                                                                                   | 210                                                                                 | 4                                                                                   | 4                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.72                                                                              | 0.72                                                                              | 0.72                                                                              | 0.72                                                                              | 0.72                                                                              | 0.72                                                                              | 0.72                                                                                | 0.72                                                                                | 0.72                                                                                | 0.72                                                                                | 0.72                                                                                | 0.72                                                                                |
| Hourly flow rate (vph)            | 163                                                                               | 651                                                                               | 15                                                                                | 0                                                                                 | 57                                                                                | 51                                                                                | 4                                                                                   | 1                                                                                   | 0                                                                                   | 292                                                                                 | 6                                                                                   | 6                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 8                                                                                   |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 108                                                                               |                                                                                   |                                                                                   | 666                                                                               |                                                                                   |                                                                                   | 1066                                                                                | 1085                                                                                | 651                                                                                 | 1060                                                                                | 1074                                                                                | 82                                                                                  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 108                                                                               |                                                                                   |                                                                                   | 666                                                                               |                                                                                   |                                                                                   | 1066                                                                                | 1085                                                                                | 651                                                                                 | 1060                                                                                | 1074                                                                                | 82                                                                                  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 89                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 98                                                                                  | 99                                                                                  | 100                                                                                 | 0                                                                                   | 97                                                                                  | 99                                                                                  |
| cM capacity (veh/h)               | 1495                                                                              |                                                                                   |                                                                                   | 933                                                                               |                                                                                   |                                                                                   | 180                                                                                 | 195                                                                                 | 472                                                                                 | 184                                                                                 | 197                                                                                 | 983                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 814                                                                               | 15                                                                                | 108                                                                               | 5                                                                                 | 304                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 163                                                                               | 0                                                                                 | 0                                                                                 | 4                                                                                 | 292                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 15                                                                                | 51                                                                                | 0                                                                                 | 6                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1495                                                                              | 1700                                                                              | 933                                                                               | 183                                                                               | 187                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.11                                                                              | 0.01                                                                              | 0.00                                                                              | 0.03                                                                              | 1.63                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 9                                                                                 | 0                                                                                 | 0                                                                                 | 2                                                                                 | 506                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 2.6                                                                               | 0.0                                                                               | 0.0                                                                               | 25.3                                                                              | 349.1                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | D                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 2.6                                                                               |                                                                                   | 0.0                                                                               | 25.3                                                                              | 349.1                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | D                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 87.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 58.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

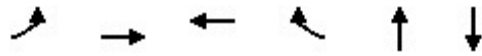
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|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 421                                                                               | 260                                                                               | 1                                                                                 | 0                                                                                 | 79                                                                                | 96                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 421                                                                               | 260                                                                               | 1                                                                                 | 0                                                                                 | 79                                                                                | 96                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 520                                                                               | 321                                                                               | 1                                                                                 | 0                                                                                 | 98                                                                                | 119                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 217                                                                               |                                                                                   |                                                                                   | 322                                                                               |                                                                                   |                                                                                   | 1460                                                                                | 1578                                                                                | 322                                                                                 | 1460                                                                                | 1460                                                                                | 98                                                                                  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 217                                                                               |                                                                                   |                                                                                   | 322                                                                               |                                                                                   |                                                                                   | 1460                                                                                | 1578                                                                                | 322                                                                                 | 1460                                                                                | 1460                                                                                | 98                                                                                  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 62                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1353                                                                              |                                                                                   |                                                                                   | 1249                                                                              |                                                                                   |                                                                                   | 75                                                                                  | 67                                                                                  | 719                                                                                 | 75                                                                                  | 79                                                                                  | 958                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 842                                                                               | 98                                                                                | 119                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 520                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 1                                                                                 | 0                                                                                 | 119                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1353                                                                              | 1249                                                                              | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.38                                                                              | 0.00                                                                              | 0.07                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 46                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 7.4                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 7.4                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.9                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 49.7%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## Queues

### 5: Commerical Entrance/Old Ivy Road & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 72   | 652  | 349  | 140  | 12   | 232  |
| v/c Ratio               | 0.13 | 0.63 | 0.34 | 0.15 | 0.07 | 0.58 |
| Control Delay           | 9.0  | 14.5 | 9.8  | 2.8  | 27.0 | 17.0 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 9.0  | 14.5 | 9.8  | 2.8  | 27.0 | 17.0 |
| Queue Length 50th (ft)  | 8    | 108  | 47   | 0    | 3    | 28   |
| Queue Length 95th (ft)  | 43   | #421 | 169  | 29   | 20   | 98   |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 599  | 1075 | 1055 | 947  | 611  | 676  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.12 | 0.61 | 0.33 | 0.15 | 0.02 | 0.34 |

#### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 66                                                                                | 600                                                                               | 0                                                                                 | 0                                                                                 | 321                                                                               | 129                                                                               | 10                                                                                 | 1                                                                                   | 0                                                                                   | 180                                                                                 | 0                                                                                   | 33                                                                                  |
| Future Volume (vph)               | 66                                                                                | 600                                                                               | 0                                                                                 | 0                                                                                 | 321                                                                               | 129                                                                               | 10                                                                                 | 1                                                                                   | 0                                                                                   | 180                                                                                 | 0                                                                                   | 33                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                    | 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                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                    | 1781                                                                                |                                                                                     |                                                                                     | 1726                                                                                |                                                                                     |
| Flt Permitted                     | 0.55                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 1048                                                                              | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                    | 1781                                                                                |                                                                                     |                                                                                     | 1726                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 72                                                                                | 652                                                                               | 0                                                                                 | 0                                                                                 | 349                                                                               | 140                                                                               | 11                                                                                 | 1                                                                                   | 0                                                                                   | 196                                                                                 | 0                                                                                   | 36                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 69                                                                                | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 108                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 72                                                                                | 652                                                                               | 0                                                                                 | 0                                                                                 | 349                                                                               | 71                                                                                | 0                                                                                  | 12                                                                                  | 0                                                                                   | 0                                                                                   | 124                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 1%                                                                                | 0%                                                                                | 0%                                                                                | 3%                                                                                | 4%                                                                                | 2%                                                                                 | 2%                                                                                  | 2%                                                                                  | 4%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                              | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 29.5                                                                              | 29.5                                                                              |                                                                                   |                                                                                   | 29.5                                                                              | 29.5                                                                              |                                                                                    | 0.9                                                                                 |                                                                                     |                                                                                     | 9.1                                                                                 |                                                                                     |
| Effective Green, g (s)            | 29.5                                                                              | 29.5                                                                              |                                                                                   |                                                                                   | 29.5                                                                              | 29.5                                                                              |                                                                                    | 0.9                                                                                 |                                                                                     |                                                                                     | 9.1                                                                                 |                                                                                     |
| Actuated g/C Ratio                | 0.50                                                                              | 0.50                                                                              |                                                                                   |                                                                                   | 0.50                                                                              | 0.50                                                                              |                                                                                    | 0.02                                                                                |                                                                                     |                                                                                     | 0.16                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                    | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 528                                                                               | 948                                                                               |                                                                                   |                                                                                   | 930                                                                               | 783                                                                               |                                                                                    | 27                                                                                  |                                                                                     |                                                                                     | 268                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.35                                                                             |                                                                                   |                                                                                   | 0.19                                                                              |                                                                                   |                                                                                    | c0.01                                                                               |                                                                                     |                                                                                     | c0.07                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.07                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.14                                                                              | 0.69                                                                              |                                                                                   |                                                                                   | 0.38                                                                              | 0.09                                                                              |                                                                                    | 0.44                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |
| Uniform Delay, d1                 | 7.7                                                                               | 11.0                                                                              |                                                                                   |                                                                                   | 8.9                                                                               | 7.5                                                                               |                                                                                    | 28.6                                                                                |                                                                                     |                                                                                     | 22.5                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 2.3                                                                               |                                                                                   |                                                                                   | 0.3                                                                               | 0.1                                                                               |                                                                                    | 4.2                                                                                 |                                                                                     |                                                                                     | 1.3                                                                                 |                                                                                     |
| Delay (s)                         | 7.9                                                                               | 13.3                                                                              |                                                                                   |                                                                                   | 9.2                                                                               | 7.6                                                                               |                                                                                    | 32.7                                                                                |                                                                                     |                                                                                     | 23.7                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 | A                                                                                 |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 12.7                                                                              |                                                                                   |                                                                                   | 8.8                                                                               |                                                                                   |                                                                                    | 32.7                                                                                |                                                                                     |                                                                                     | 23.7                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.3                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.63                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 58.5                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 70.2%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
2021 Existing AM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 394 | 321 | 26  | 199 | 629 | 80  | 52  | 212 | 76 |
| Average Queue (ft)    | 197 | 149 | 3   | 39  | 467 | 25  | 13  | 184 | 73 |
| 95th Queue (ft)       | 330 | 277 | 16  | 148 | 719 | 60  | 36  | 252 | 83 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) |     |     |     |     | 23  |     |     | 18  |    |
| Queuing Penalty (veh) |     |     |     |     | 0   |     |     | 115 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     | 0   |     | 0   | 43  |     |     | 25  | 26 |
| Queuing Penalty (veh) |     | 0   |     | 0   | 11  |     |     | 137 | 23 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 112 | 75  | 71  | 1160 |
| Average Queue (ft)    | 45  | 30  | 18  | 1130 |
| 95th Queue (ft)       | 87  | 62  | 55  | 1158 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     |     |     | 97   |
| Queuing Penalty (veh) |     |     |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LT  | R   |
| Maximum Queue (ft)    | 111 | 30  | 325 | 88  |
| Average Queue (ft)    | 17  | 3   | 116 | 9   |
| 95th Queue (ft)       | 65  | 18  | 277 | 64  |
| Link Distance (ft)    | 299 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     | 5   |     |
| Queuing Penalty (veh) |     |     | 0   |     |
| Storage Bay Dist (ft) |     |     |     | 190 |
| Storage Blk Time (%)  | 0   |     | 12  | 0   |
| Queuing Penalty (veh) | 0   |     | 1   | 0   |

Queuing and Blocking Report  
2021 Existing AM Peak

01/21/2022

Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB |
|-----------------------|-----|----|
| Directions Served     | LTR | R  |
| Maximum Queue (ft)    | 166 | 44 |
| Average Queue (ft)    | 63  | 14 |
| 95th Queue (ft)       | 125 | 42 |
| Link Distance (ft)    | 332 |    |
| Upstream Blk Time (%) |     |    |
| Queuing Penalty (veh) |     |    |
| Storage Bay Dist (ft) |     | 50 |
| Storage Blk Time (%)  |     | 0  |
| Queuing Penalty (veh) |     | 0  |

Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 81 | 241  | 174 | 66  | 39  | 178 |
| Average Queue (ft)    | 14 | 85   | 75  | 29  | 11  | 91  |
| 95th Queue (ft)       | 54 | 187  | 146 | 58  | 33  | 151 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 0  | 5    |     |     |     |     |
| Queuing Penalty (veh) | 0  | 3    |     |     |     |     |

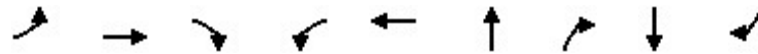
Network Summary

Network wide Queuing Penalty: 291

## Queues

### 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 442  | 660  | 21   | 42   | 721  | 27   | 36   | 85   | 593  |
| v/c Ratio               | 0.90 | 0.54 | 0.02 | 0.10 | 0.91 | 0.23 | 0.11 | 0.58 | 0.93 |
| Control Delay           | 56.9 | 18.2 | 0.1  | 10.7 | 51.6 | 58.1 | 0.7  | 68.3 | 44.7 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 56.9 | 18.2 | 0.1  | 10.7 | 51.6 | 58.1 | 0.7  | 68.3 | 44.7 |
| Queue Length 50th (ft)  | 285  | 333  | 0    | 9    | ~557 | 20   | 0    | 65   | 214  |
| Queue Length 95th (ft)  | #523 | 464  | 0    | 23   | #821 | 51   | 0    | 116  | #483 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 490  | 1215 | 1097 | 429  | 789  | 139  | 337  | 187  | 636  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.90 | 0.54 | 0.02 | 0.10 | 0.91 | 0.19 | 0.11 | 0.45 | 0.93 |

#### Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 420                                                                               | 627                                                                               | 20                                                                                | 40                                                                                | 617                                                                               | 68                                                                                | 17                                                                                 | 9                                                                                   | 34                                                                                  | 64                                                                                  | 17                                                                                  | 563                                                                                 |
| Future Volume (vph)               | 420                                                                               | 627                                                                               | 20                                                                                | 40                                                                                | 617                                                                               | 68                                                                                | 17                                                                                 | 9                                                                                   | 34                                                                                  | 64                                                                                  | 17                                                                                  | 563                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1752                                                                              | 1881                                                                              | 1615                                                                              | 1752                                                                              | 1855                                                                              |                                                                                   |                                                                                    | 1757                                                                                | 1524                                                                                |                                                                                     | 1786                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.07                                                                              | 1.00                                                                              | 1.00                                                                              | 0.41                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 131                                                                               | 1881                                                                              | 1615                                                                              | 764                                                                               | 1855                                                                              |                                                                                   |                                                                                    | 1757                                                                                | 1524                                                                                |                                                                                     | 1786                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                               | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                |
| Adj. Flow (vph)                   | 442                                                                               | 660                                                                               | 21                                                                                | 42                                                                                | 649                                                                               | 72                                                                                | 18                                                                                 | 9                                                                                   | 36                                                                                  | 67                                                                                  | 18                                                                                  | 593                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 34                                                                                  | 0                                                                                   | 0                                                                                   | 163                                                                                 |
| Lane Group Flow (vph)             | 442                                                                               | 660                                                                               | 13                                                                                | 42                                                                                | 718                                                                               | 0                                                                                 | 0                                                                                  | 27                                                                                  | 2                                                                                   | 0                                                                                   | 85                                                                                  | 430                                                                                 |
| Heavy Vehicles (%)                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 7%                                                                                 | 0%                                                                                  | 6%                                                                                  | 3%                                                                                  | 0%                                                                                  | 2%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                              | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 85.6                                                                              | 72.1                                                                              | 72.1                                                                              | 54.3                                                                              | 48.6                                                                              |                                                                                   |                                                                                    | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 8.3                                                                                 | 37.5                                                                                |
| Effective Green, g (s)            | 85.6                                                                              | 72.1                                                                              | 72.1                                                                              | 54.3                                                                              | 48.6                                                                              |                                                                                   |                                                                                    | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 8.3                                                                                 | 37.5                                                                                |
| Actuated g/C Ratio                | 0.71                                                                              | 0.60                                                                              | 0.60                                                                              | 0.45                                                                              | 0.41                                                                              |                                                                                   |                                                                                    | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.07                                                                                | 0.31                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 487                                                                               | 1130                                                                              | 970                                                                               | 392                                                                               | 751                                                                               |                                                                                   |                                                                                    | 93                                                                                  | 81                                                                                  |                                                                                     | 123                                                                                 | 494                                                                                 |
| v/s Ratio Prot                    | c0.22                                                                             | 0.35                                                                              |                                                                                   | 0.01                                                                              | c0.39                                                                             |                                                                                   |                                                                                    | c0.02                                                                               |                                                                                     |                                                                                     | 0.05                                                                                | c0.21                                                                               |
| v/s Ratio Perm                    | 0.43                                                                              |                                                                                   | 0.01                                                                              | 0.04                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.06                                                                                |
| v/c Ratio                         | 0.91                                                                              | 0.58                                                                              | 0.01                                                                              | 0.11                                                                              | 0.96                                                                              |                                                                                   |                                                                                    | 0.29                                                                                | 0.02                                                                                |                                                                                     | 0.69                                                                                | 0.87                                                                                |
| Uniform Delay, d1                 | 36.7                                                                              | 14.7                                                                              | 9.6                                                                               | 18.4                                                                              | 34.7                                                                              |                                                                                   |                                                                                    | 54.6                                                                                | 53.8                                                                                |                                                                                     | 54.6                                                                                | 39.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 20.1                                                                              | 2.2                                                                               | 0.0                                                                               | 0.0                                                                               | 23.7                                                                              |                                                                                   |                                                                                    | 0.6                                                                                 | 0.0                                                                                 |                                                                                     | 12.7                                                                                | 14.9                                                                                |
| Delay (s)                         | 56.8                                                                              | 16.9                                                                              | 9.7                                                                               | 18.5                                                                              | 58.4                                                                              |                                                                                   |                                                                                    | 55.2                                                                                | 53.9                                                                                |                                                                                     | 67.3                                                                                | 53.9                                                                                |
| Level of Service                  | E                                                                                 | B                                                                                 | A                                                                                 | B                                                                                 | E                                                                                 |                                                                                   |                                                                                    | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   |
| Approach Delay (s)                |                                                                                   | 32.5                                                                              |                                                                                   |                                                                                   | 56.2                                                                              |                                                                                   |                                                                                    | 54.5                                                                                |                                                                                     |                                                                                     | 55.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 45.9                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.89                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 96.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
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|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 35                                                                                | 21                                                                                | 55                                                                                | 55                                                                                | 0                                                                                 | 29                                                                                  | 0                                                                                   | 459                                                                                 | 9                                                                                   | 582                                                                                 | 14                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 35                                                                                | 21                                                                                | 55                                                                                | 55                                                                                | 0                                                                                 | 29                                                                                  | 0                                                                                   | 459                                                                                 | 9                                                                                   | 582                                                                                 | 14                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 37                                                                                | 22                                                                                | 59                                                                                | 59                                                                                | 0                                                                                 | 31                                                                                  | 0                                                                                   | 488                                                                                 | 10                                                                                  | 619                                                                                 | 15                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              |                                                                                   | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              |                                                                                     |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 982                                                                               | 1196                                                                              | 626                                                                               | 993                                                                               | 960                                                                               | 244                                                                               | 634                                                                                 |                                                                                     |                                                                                     | 488                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 902                                                                               | 1150                                                                              | 626                                                                               | 915                                                                               | 876                                                                               | 50                                                                                | 634                                                                                 |                                                                                     |                                                                                     | 331                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 78                                                                                | 95                                                                                | 65                                                                                | 75                                                                                | 100                                                                               | 97                                                                                  |                                                                                     |                                                                                     | 99                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 178                                                                               | 166                                                                               | 478                                                                               | 168                                                                               | 240                                                                               | 887                                                                               | 959                                                                                 |                                                                                     |                                                                                     | 1073                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 59                                                                                | 118                                                                               | 519                                                                               | 644                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 59                                                                                | 31                                                                                | 10                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 22                                                                                | 0                                                                                 | 488                                                                               | 15                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 219                                                                               | 198                                                                               | 959                                                                               | 1073                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.27                                                                              | 0.60                                                                              | 0.03                                                                              | 0.01                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 26                                                                                | 83                                                                                | 3                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 27.3                                                                              | 46.9                                                                              | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | D                                                                                 | E                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 27.3                                                                              | 46.9                                                                              | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | D                                                                                 | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.8                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 66.9%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
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|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (veh/h)            | 32                                                                                | 462                                                                               | 1                                                                                 | 0                                                                                 | 101                                                                               | 20                                                                                | 1                                                                                   | 0                                                                                   | 6                                                                                   | 135                                                                                 | 0                                                                                   | 13                                                                                  |
| Future Volume (Veh/h)             | 32                                                                                | 462                                                                               | 1                                                                                 | 0                                                                                 | 101                                                                               | 20                                                                                | 1                                                                                   | 0                                                                                   | 6                                                                                   | 135                                                                                 | 0                                                                                   | 13                                                                                  |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                |
| Hourly flow rate (vph)            | 33                                                                                | 481                                                                               | 1                                                                                 | 0                                                                                 | 105                                                                               | 21                                                                                | 1                                                                                   | 0                                                                                   | 6                                                                                   | 141                                                                                 | 0                                                                                   | 14                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 8                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 126                                                                               |                                                                                   |                                                                                   | 482                                                                               |                                                                                   |                                                                                   | 670                                                                                 | 673                                                                                 | 481                                                                                 | 668                                                                                 | 664                                                                                 | 116                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 126                                                                               |                                                                                   |                                                                                   | 482                                                                               |                                                                                   |                                                                                   | 670                                                                                 | 673                                                                                 | 481                                                                                 | 668                                                                                 | 664                                                                                 | 116                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 98                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 99                                                                                  | 61                                                                                  | 100                                                                                 | 99                                                                                  |
| cM capacity (veh/h)               | 1473                                                                              |                                                                                   |                                                                                   | 1091                                                                              |                                                                                   |                                                                                   | 362                                                                                 | 371                                                                                 | 589                                                                                 | 363                                                                                 | 375                                                                                 | 942                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 514                                                                               | 1                                                                                 | 126                                                                               | 7                                                                                 | 155                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 33                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 141                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 1                                                                                 | 21                                                                                | 6                                                                                 | 14                                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1473                                                                              | 1700                                                                              | 1091                                                                              | 541                                                                               | 399                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.02                                                                              | 0.00                                                                              | 0.00                                                                              | 0.01                                                                              | 0.39                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 2                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 45                                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 0.7                                                                               | 0.0                                                                               | 0.0                                                                               | 11.7                                                                              | 20.0                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 0.7                                                                               |                                                                                   | 0.0                                                                               | 11.7                                                                              | 20.0                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 4.4                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 56.8%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

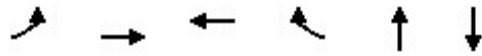
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| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 458                                                                               | 155                                                                               | 0                                                                                 | 0                                                                                 | 125                                                                               | 223                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 458                                                                               | 155                                                                               | 0                                                                                 | 0                                                                                 | 125                                                                               | 223                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.92                                                                                | 0.93                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 492                                                                               | 167                                                                               | 0                                                                                 | 0                                                                                 | 134                                                                               | 240                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 374                                                                               |                                                                                   |                                                                                   | 167                                                                               |                                                                                   |                                                                                   | 1285                                                                                | 1525                                                                                | 167                                                                                 | 1286                                                                                | 1285                                                                                | 134                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 374                                                                               |                                                                                   |                                                                                   | 167                                                                               |                                                                                   |                                                                                   | 1285                                                                                | 1525                                                                                | 167                                                                                 | 1286                                                                                | 1285                                                                                | 134                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 58                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 99                                                                                  | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1184                                                                              |                                                                                   |                                                                                   | 1423                                                                              |                                                                                   |                                                                                   | 96                                                                                  | 70                                                                                  | 877                                                                                 | 95                                                                                  | 96                                                                                  | 915                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 659                                                                               | 134                                                                               | 240                                                                               | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 492                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 0                                                                                 | 240                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1184                                                                              | 1423                                                                              | 1700                                                                              | 70                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.42                                                                              | 0.00                                                                              | 0.14                                                                              | 0.01                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 52                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 8.8                                                                               | 0.0                                                                               | 0.0                                                                               | 57.5                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 8.8                                                                               | 0.0                                                                               |                                                                                   | 57.5                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.7                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 60.7%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## Queues

### 5: Commerical Entrance/Old Ivy Road & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 44   | 527  | 737  | 291  | 17   | 208  |
| v/c Ratio               | 0.18 | 0.50 | 0.69 | 0.28 | 0.06 | 0.55 |
| Control Delay           | 10.4 | 10.7 | 15.3 | 2.4  | 0.5  | 15.4 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 10.4 | 10.7 | 15.3 | 2.4  | 0.5  | 15.4 |
| Queue Length 50th (ft)  | 5    | 76   | 125  | 1    | 0    | 22   |
| Queue Length 95th (ft)  | 32   | 253  | #467 | 39   | 0    | 82   |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 247  | 1058 | 1068 | 1031 | 691  | 685  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.18 | 0.50 | 0.69 | 0.28 | 0.02 | 0.30 |

#### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 40                                                                                | 474                                                                               | 0                                                                                 | 0                                                                                 | 663                                                                               | 262                                                                               | 13                                                                                  | 0                                                                                   | 3                                                                                   | 134                                                                                 | 0                                                                                   | 53                                                                                  |
| Future Volume (vph)               | 40                                                                                | 474                                                                               | 0                                                                                 | 0                                                                                 | 663                                                                               | 262                                                                               | 13                                                                                  | 0                                                                                   | 3                                                                                   | 134                                                                                 | 0                                                                                   | 53                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 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                                                                              |                                                                                     | 0.98                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1781                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     | 0.23                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 435                                                                               | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1781                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.90                                                                              | 0.90                                                                              | 0.90                                                                              | 0.90                                                                              | 0.90                                                                              | 0.90                                                                              | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                | 0.90                                                                                |
| Adj. Flow (vph)                   | 44                                                                                | 527                                                                               | 0                                                                                 | 0                                                                                 | 737                                                                               | 291                                                                               | 14                                                                                  | 0                                                                                   | 3                                                                                   | 149                                                                                 | 0                                                                                   | 59                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 136                                                                               | 0                                                                                   | 17                                                                                  | 0                                                                                   | 0                                                                                   | 110                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 44                                                                                | 527                                                                               | 0                                                                                 | 0                                                                                 | 737                                                                               | 155                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 98                                                                                  | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 2%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                   | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 30.4                                                                              | 30.4                                                                              |                                                                                   |                                                                                   | 30.4                                                                              | 30.4                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 8.2                                                                                 |                                                                                     |
| Effective Green, g (s)            | 30.4                                                                              | 30.4                                                                              |                                                                                   |                                                                                   | 30.4                                                                              | 30.4                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 8.2                                                                                 |                                                                                     |
| Actuated g/C Ratio                | 0.52                                                                              | 0.52                                                                              |                                                                                   |                                                                                   | 0.52                                                                              | 0.52                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.14                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                     | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 226                                                                               | 971                                                                               |                                                                                   |                                                                                   | 980                                                                               | 833                                                                               |                                                                                     | 21                                                                                  |                                                                                     |                                                                                     | 248                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.28                                                                              |                                                                                   |                                                                                   | c0.39                                                                             |                                                                                   |                                                                                     | c0.00                                                                               |                                                                                     |                                                                                     | c0.06                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.10                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.10                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.19                                                                              | 0.54                                                                              |                                                                                   |                                                                                   | 0.75                                                                              | 0.19                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.40                                                                                |                                                                                     |
| Uniform Delay, d1                 | 7.4                                                                               | 9.3                                                                               |                                                                                   |                                                                                   | 11.0                                                                              | 7.4                                                                               |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 22.8                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 0.8                                                                               |                                                                                   |                                                                                   | 3.5                                                                               | 0.1                                                                               |                                                                                     | 0.1                                                                                 |                                                                                     |                                                                                     | 1.0                                                                                 |                                                                                     |
| Delay (s)                         | 8.0                                                                               | 10.1                                                                              |                                                                                   |                                                                                   | 14.5                                                                              | 7.5                                                                               |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 23.8                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 9.9                                                                               |                                                                                   |                                                                                   | 12.5                                                                              |                                                                                   |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 23.8                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.2                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.66                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 58.3                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
2021 Existing PM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 554 | 374 | 32  | 200 | 610 | 84  | 64  | 214 | 75 |
| Average Queue (ft)    | 262 | 164 | 5   | 58  | 516 | 25  | 17  | 200 | 74 |
| 95th Queue (ft)       | 493 | 318 | 22  | 183 | 736 | 64  | 46  | 230 | 82 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) | 0   |     |     |     | 34  |     |     | 27  |    |
| Queuing Penalty (veh) | 0   |     |     |     | 0   |     |     | 179 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     | 0   |     | 0   | 50  |     |     | 26  | 35 |
| Queuing Penalty (veh) |     | 0   |     | 1   | 20  |     |     | 146 | 28 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 93  | 118 | 69  | 1156 |
| Average Queue (ft)    | 34  | 53  | 17  | 1071 |
| 95th Queue (ft)       | 73  | 97  | 51  | 1318 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     |     |     | 84   |
| Queuing Penalty (veh) |     |     |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LT  | R   |
| Maximum Queue (ft)    | 53  | 28  | 121 | 30  |
| Average Queue (ft)    | 4   | 5   | 49  | 12  |
| 95th Queue (ft)       | 25  | 22  | 92  | 35  |
| Link Distance (ft)    | 299 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 190 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

Queuing and Blocking Report  
2021 Existing PM Peak

01/21/2022

Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB   | WB | NB  |
|-----------------------|-----|------|----|-----|
| Directions Served     | LTR | LT   | R  | LTR |
| Maximum Queue (ft)    | 279 | 3    | 49 | 21  |
| Average Queue (ft)    | 118 | 0    | 30 | 2   |
| 95th Queue (ft)       | 226 | 3    | 51 | 13  |
| Link Distance (ft)    | 332 | 2715 |    | 193 |
| Upstream Blk Time (%) | 0   |      |    |     |
| Queuing Penalty (veh) | 0   |      |    |     |
| Storage Bay Dist (ft) |     |      | 50 |     |
| Storage Blk Time (%)  |     |      | 1  |     |
| Queuing Penalty (veh) |     |      | 1  |     |

Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 72 | 153  | 328 | 80  | 45  | 166 |
| Average Queue (ft)    | 11 | 49   | 139 | 40  | 12  | 77  |
| 95th Queue (ft)       | 42 | 125  | 253 | 68  | 37  | 132 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 0  | 2    |     |     |     |     |
| Queuing Penalty (veh) | 1  | 1    |     |     |     |     |

Network Summary

Network wide Queuing Penalty: 376

# **Appendix C**

## **Synchro Analysis for 2025 Background Conditions**

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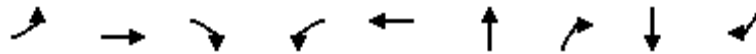


## Queues

2025 Background AM Peak

01/21/2022

## 1: Canterbury Road /Route 846 &amp; Ivy Road



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 424  | 676  | 11   | 28   | 729  | 34   | 27   | 103  | 617  |
| v/c Ratio               | 0.90 | 0.58 | 0.01 | 0.07 | 1.01 | 0.27 | 0.08 | 0.65 | 0.93 |
| Control Delay           | 57.0 | 18.5 | 0.0  | 11.1 | 73.7 | 58.7 | 0.5  | 71.3 | 43.2 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 57.0 | 18.5 | 0.0  | 11.1 | 73.7 | 58.7 | 0.5  | 71.3 | 43.2 |
| Queue Length 50th (ft)  | 264  | 359  | 0    | 6    | ~645 | 26   | 0    | 78   | 210  |
| Queue Length 95th (ft)  | #484 | 499  | 0    | 18   | #885 | 60   | 0    | 135  | #511 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 474  | 1163 | 1073 | 405  | 719  | 147  | 338  | 199  | 663  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.89 | 0.58 | 0.01 | 0.07 | 1.01 | 0.23 | 0.08 | 0.52 | 0.93 |

## Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

2025 Background AM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 390                                                                               | 622                                                                               | 10                                                                                | 26                                                                                | 565                                                                               | 106                                                                               | 13                                                                                 | 18                                                                                  | 25                                                                                  | 81                                                                                  | 14                                                                                  | 568                                                                                 |
| Future Volume (vph)               | 390                                                                               | 622                                                                               | 10                                                                                | 26                                                                                | 565                                                                               | 106                                                                               | 13                                                                                 | 18                                                                                  | 25                                                                                  | 81                                                                                  | 14                                                                                  | 568                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1770                                                                              | 1845                                                                              | 1615                                                                              | 1736                                                                              | 1761                                                                              |                                                                                   |                                                                                    | 1862                                                                                | 1538                                                                                |                                                                                     | 1762                                                                                | 1553                                                                                |
| Flt Permitted                     | 0.07                                                                              | 1.00                                                                              | 1.00                                                                              | 0.41                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 135                                                                               | 1845                                                                              | 1615                                                                              | 745                                                                               | 1761                                                                              |                                                                                   |                                                                                    | 1862                                                                                | 1538                                                                                |                                                                                     | 1762                                                                                | 1553                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 424                                                                               | 676                                                                               | 11                                                                                | 28                                                                                | 614                                                                               | 115                                                                               | 14                                                                                 | 20                                                                                  | 27                                                                                  | 88                                                                                  | 15                                                                                  | 617                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 4                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 26                                                                                  | 0                                                                                   | 0                                                                                   | 172                                                                                 |
| Lane Group Flow (vph)             | 424                                                                               | 676                                                                               | 7                                                                                 | 28                                                                                | 724                                                                               | 0                                                                                 | 0                                                                                  | 34                                                                                  | 1                                                                                   | 0                                                                                   | 103                                                                                 | 445                                                                                 |
| Heavy Vehicles (%)                | 2%                                                                                | 3%                                                                                | 0%                                                                                | 4%                                                                                | 6%                                                                                | 2%                                                                                | 0%                                                                                 | 0%                                                                                  | 5%                                                                                  | 4%                                                                                  | 0%                                                                                  | 4%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                              | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 83.0                                                                              | 71.3                                                                              | 71.3                                                                              | 51.4                                                                              | 47.5                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 10.8                                                                                | 38.5                                                                                |
| Effective Green, g (s)            | 83.0                                                                              | 71.3                                                                              | 71.3                                                                              | 51.4                                                                              | 47.5                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 10.8                                                                                | 38.5                                                                                |
| Actuated g/C Ratio                | 0.69                                                                              | 0.59                                                                              | 0.59                                                                              | 0.43                                                                              | 0.40                                                                              |                                                                                   |                                                                                    | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.09                                                                                | 0.32                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 470                                                                               | 1096                                                                              | 959                                                                               | 351                                                                               | 697                                                                               |                                                                                   |                                                                                    | 100                                                                                 | 83                                                                                  |                                                                                     | 158                                                                                 | 498                                                                                 |
| v/s Ratio Prot                    | c0.21                                                                             | 0.37                                                                              |                                                                                   | 0.00                                                                              | c0.41                                                                             |                                                                                   |                                                                                    | c0.02                                                                               |                                                                                     |                                                                                     | 0.06                                                                                | c0.21                                                                               |
| v/s Ratio Perm                    | 0.42                                                                              |                                                                                   | 0.00                                                                              | 0.03                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.90                                                                              | 0.62                                                                              | 0.01                                                                              | 0.08                                                                              | 1.04                                                                              |                                                                                   |                                                                                    | 0.34                                                                                | 0.02                                                                                |                                                                                     | 0.65                                                                                | 0.89                                                                                |
| Uniform Delay, d1                 | 37.0                                                                              | 15.6                                                                              | 9.9                                                                               | 19.9                                                                              | 36.2                                                                              |                                                                                   |                                                                                    | 54.7                                                                                | 53.7                                                                                |                                                                                     | 52.8                                                                                | 38.8                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 19.9                                                                              | 2.6                                                                               | 0.0                                                                               | 0.0                                                                               | 44.4                                                                              |                                                                                   |                                                                                    | 0.7                                                                                 | 0.0                                                                                 |                                                                                     | 7.1                                                                                 | 17.8                                                                                |
| Delay (s)                         | 56.9                                                                              | 18.2                                                                              | 9.9                                                                               | 20.0                                                                              | 80.6                                                                              |                                                                                   |                                                                                    | 55.4                                                                                | 53.8                                                                                |                                                                                     | 59.9                                                                                | 56.6                                                                                |
| Level of Service                  | E                                                                                 | B                                                                                 | A                                                                                 | B                                                                                 | F                                                                                 |                                                                                   |                                                                                    | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | E                                                                                   |
| Approach Delay (s)                |                                                                                   | 32.9                                                                              |                                                                                   |                                                                                   | 78.4                                                                              |                                                                                   |                                                                                    | 54.7                                                                                |                                                                                     |                                                                                     | 57.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 53.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.93                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 96.4%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

2025 Background AM Peak

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 68                                                                                | 34                                                                                | 32                                                                                | 18                                                                                | 0                                                                                 | 21                                                                                 | 0                                                                                   | 493                                                                                 | 54                                                                                  | 607                                                                                 | 41                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 68                                                                                | 34                                                                                | 32                                                                                | 18                                                                                | 0                                                                                 | 21                                                                                 | 0                                                                                   | 493                                                                                 | 54                                                                                  | 607                                                                                 | 41                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                    | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 74                                                                                | 37                                                                                | 35                                                                                | 20                                                                                | 0                                                                                 | 23                                                                                 | 0                                                                                   | 536                                                                                 | 59                                                                                  | 660                                                                                 | 45                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              |                                                                                   | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              |                                                                                    |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1124                                                                              | 1382                                                                              | 682                                                                               | 1188                                                                              | 1137                                                                              | 268                                                                               | 705                                                                                |                                                                                     |                                                                                     | 536                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1069                                                                              | 1365                                                                              | 682                                                                               | 1143                                                                              | 1084                                                                              | 87                                                                                | 705                                                                                |                                                                                     |                                                                                     | 395                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.2                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.6                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 38                                                                                | 92                                                                                | 46                                                                                | 89                                                                                | 100                                                                               | 97                                                                                 |                                                                                     |                                                                                     | 94                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 150                                                                               | 119                                                                               | 453                                                                               | 65                                                                                | 175                                                                               | 852                                                                               | 902                                                                                |                                                                                     |                                                                                     | 1025                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 111                                                                               | 55                                                                                | 559                                                                               | 764                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 35                                                                                | 23                                                                                | 59                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 37                                                                                | 0                                                                                 | 536                                                                               | 45                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 158                                                                               | 84                                                                                | 902                                                                               | 1025                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.70                                                                              | 0.65                                                                              | 0.03                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 104                                                                               | 77                                                                                | 2                                                                                 | 5                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 69.1                                                                              | 106.5                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 69.1                                                                              | 106.5                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 10.1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 71.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

2025 Background AM Peak

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
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|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (veh/h)            | 122                                                                               | 488                                                                               | 11                                                                                | 0                                                                                 | 43                                                                                | 39                                                                                | 3                                                                                  | 1                                                                                   | 0                                                                                   | 219                                                                                 | 4                                                                                   | 4                                                                                   |
| Future Volume (Veh/h)             | 122                                                                               | 488                                                                               | 11                                                                                | 0                                                                                 | 43                                                                                | 39                                                                                | 3                                                                                  | 1                                                                                   | 0                                                                                   | 219                                                                                 | 4                                                                                   | 4                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 133                                                                               | 530                                                                               | 12                                                                                | 0                                                                                 | 47                                                                                | 42                                                                                | 3                                                                                  | 1                                                                                   | 0                                                                                   | 238                                                                                 | 4                                                                                   | 4                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 89                                                                                |                                                                                   |                                                                                   | 542                                                                               |                                                                                   |                                                                                   | 868                                                                                | 885                                                                                 | 530                                                                                 | 864                                                                                 | 876                                                                                 | 68                                                                                  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 89                                                                                |                                                                                   |                                                                                   | 542                                                                               |                                                                                   |                                                                                   | 868                                                                                | 885                                                                                 | 530                                                                                 | 864                                                                                 | 876                                                                                 | 68                                                                                  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 91                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 99                                                                                 | 100                                                                                 | 100                                                                                 | 6                                                                                   | 98                                                                                  | 100                                                                                 |
| cM capacity (veh/h)               | 1519                                                                              |                                                                                   |                                                                                   | 1037                                                                              |                                                                                   |                                                                                   | 253                                                                                | 261                                                                                 | 553                                                                                 | 254                                                                                 | 264                                                                                 | 1001                                                                                |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 663                                                                               | 12                                                                                | 89                                                                                | 4                                                                                 | 246                                                                               |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 133                                                                               | 0                                                                                 | 0                                                                                 | 3                                                                                 | 238                                                                               |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 12                                                                                | 42                                                                                | 0                                                                                 | 4                                                                                 |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1519                                                                              | 1700                                                                              | 1037                                                                              | 255                                                                               | 258                                                                               |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.09                                                                              | 0.01                                                                              | 0.00                                                                              | 0.02                                                                              | 0.95                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 7                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 221                                                                               |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 2.3                                                                               | 0.0                                                                               | 0.0                                                                               | 19.4                                                                              | 85.7                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 | F                                                                                 |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 2.3                                                                               |                                                                                   | 0.0                                                                               | 19.4                                                                              | 85.7                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | C                                                                                 | F                                                                                 |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 22.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 60.8%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

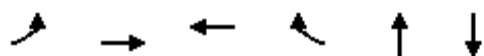
2025 Background AM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                    |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 438                                                                               | 271                                                                               | 1                                                                                 | 0                                                                                 | 82                                                                                | 100                                                                               | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 438                                                                               | 271                                                                               | 1                                                                                 | 0                                                                                 | 82                                                                                | 100                                                                               | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 476                                                                               | 295                                                                               | 1                                                                                 | 0                                                                                 | 89                                                                                | 109                                                                               | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 198                                                                               |                                                                                   |                                                                                   | 296                                                                               |                                                                                   |                                                                                   | 1336                                                                               | 1446                                                                                | 296                                                                                 | 1336                                                                                | 1337                                                                                | 89                                                                                  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 198                                                                               |                                                                                   |                                                                                   | 296                                                                               |                                                                                   |                                                                                   | 1336                                                                               | 1446                                                                                | 296                                                                                 | 1336                                                                                | 1337                                                                                | 89                                                                                  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 65                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1375                                                                              |                                                                                   |                                                                                   | 1277                                                                              |                                                                                   |                                                                                   | 95                                                                                 | 86                                                                                  | 744                                                                                 | 95                                                                                  | 100                                                                                 | 969                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 772                                                                               | 89                                                                                | 109                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 476                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 1                                                                                 | 0                                                                                 | 109                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1375                                                                              | 1277                                                                              | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.35                                                                              | 0.00                                                                              | 0.06                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 39                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 7.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 7.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 51.4%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## 5: Commerical Entrance/Old Ivy Road &amp; Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 75   | 678  | 363  | 146  | 12   | 240  |
| v/c Ratio               | 0.13 | 0.65 | 0.35 | 0.16 | 0.07 | 0.60 |
| Control Delay           | 9.3  | 15.2 | 9.9  | 2.7  | 27.3 | 17.6 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 9.3  | 15.2 | 9.9  | 2.7  | 27.3 | 17.6 |
| Queue Length 50th (ft)  | 9    | 117  | 50   | 0    | 3    | 31   |
| Queue Length 95th (ft)  | 46   | #452 | 178  | 29   | 20   | 103  |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 567  | 1044 | 1024 | 927  | 593  | 660  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.13 | 0.65 | 0.35 | 0.16 | 0.02 | 0.36 |

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

2025 Background AM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 69                                                                                | 624                                                                               | 0                                                                                 | 0                                                                                 | 334                                                                               | 134                                                                               | 10                                                                                  | 1                                                                                   | 0                                                                                   | 187                                                                                 | 0                                                                                   | 34                                                                                  |
| Future Volume (vph)               | 69                                                                                | 624                                                                               | 0                                                                                 | 0                                                                                 | 334                                                                               | 134                                                                               | 10                                                                                  | 1                                                                                   | 0                                                                                   | 187                                                                                 | 0                                                                                   | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 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                                                                                |                                                                                     |                                                                                     | 0.98                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                     | 1781                                                                                |                                                                                     |                                                                                     | 1727                                                                                |                                                                                     |
| Flt Permitted                     | 0.54                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 1022                                                                              | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                     | 1781                                                                                |                                                                                     |                                                                                     | 1727                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 75                                                                                | 678                                                                               | 0                                                                                 | 0                                                                                 | 363                                                                               | 146                                                                               | 11                                                                                  | 1                                                                                   | 0                                                                                   | 203                                                                                 | 0                                                                                   | 37                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 71                                                                                | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 108                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 75                                                                                | 678                                                                               | 0                                                                                 | 0                                                                                 | 363                                                                               | 75                                                                                | 0                                                                                   | 12                                                                                  | 0                                                                                   | 0                                                                                   | 132                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 1%                                                                                | 0%                                                                                | 0%                                                                                | 3%                                                                                | 4%                                                                                | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 4%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                   | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 30.6                                                                              | 30.6                                                                              |                                                                                   |                                                                                   | 30.6                                                                              | 30.6                                                                              |                                                                                     | 0.9                                                                                 |                                                                                     |                                                                                     | 9.3                                                                                 |                                                                                     |
| Effective Green, g (s)            | 30.6                                                                              | 30.6                                                                              |                                                                                   |                                                                                   | 30.6                                                                              | 30.6                                                                              |                                                                                     | 0.9                                                                                 |                                                                                     |                                                                                     | 9.3                                                                                 |                                                                                     |
| Actuated g/C Ratio                | 0.51                                                                              | 0.51                                                                              |                                                                                   |                                                                                   | 0.51                                                                              | 0.51                                                                              |                                                                                     | 0.02                                                                                |                                                                                     |                                                                                     | 0.16                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                     | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 522                                                                               | 962                                                                               |                                                                                   |                                                                                   | 944                                                                               | 794                                                                               |                                                                                     | 26                                                                                  |                                                                                     |                                                                                     | 268                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.36                                                                             |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                     | c0.01                                                                               |                                                                                     |                                                                                     | c0.08                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.07                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.14                                                                              | 0.70                                                                              |                                                                                   |                                                                                   | 0.38                                                                              | 0.09                                                                              |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.49                                                                                |                                                                                     |
| Uniform Delay, d1                 | 7.7                                                                               | 11.2                                                                              |                                                                                   |                                                                                   | 8.9                                                                               | 7.5                                                                               |                                                                                     | 29.2                                                                                |                                                                                     |                                                                                     | 23.1                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 2.5                                                                               |                                                                                   |                                                                                   | 0.4                                                                               | 0.1                                                                               |                                                                                     | 4.7                                                                                 |                                                                                     |                                                                                     | 1.4                                                                                 |                                                                                     |
| Delay (s)                         | 7.9                                                                               | 13.7                                                                              |                                                                                   |                                                                                   | 9.2                                                                               | 7.6                                                                               |                                                                                     | 33.9                                                                                |                                                                                     |                                                                                     | 24.5                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 | A                                                                                 |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 13.1                                                                              |                                                                                   |                                                                                   | 8.8                                                                               |                                                                                   |                                                                                     | 33.9                                                                                |                                                                                     |                                                                                     | 24.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.65                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 59.8                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 70.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
2025 Background AM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 456 | 420 | 29  | 199 | 638 | 90  | 41  | 213 | 76 |
| Average Queue (ft)    | 231 | 159 | 3   | 33  | 540 | 29  | 12  | 185 | 73 |
| 95th Queue (ft)       | 387 | 313 | 17  | 131 | 750 | 71  | 31  | 250 | 81 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) |     |     |     |     | 38  |     |     | 17  |    |
| Queuing Penalty (veh) |     |     |     |     | 0   |     |     | 115 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     | 0   |     | 0   | 51  |     |     | 23  | 27 |
| Queuing Penalty (veh) |     | 0   |     | 0   | 13  |     |     | 132 | 26 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 138 | 86  | 73  | 1164 |
| Average Queue (ft)    | 51  | 34  | 19  | 1132 |
| 95th Queue (ft)       | 104 | 68  | 57  | 1159 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     |     |     | 99   |
| Queuing Penalty (veh) |     |     |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LTR | LT  | R   |
| Maximum Queue (ft)    | 87  | 3   | 28  | 232 | 46  |
| Average Queue (ft)    | 15  | 0   | 4   | 90  | 5   |
| 95th Queue (ft)       | 55  | 2   | 19  | 171 | 30  |
| Link Distance (ft)    | 299 | 332 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     |     | 190 |
| Storage Blk Time (%)  |     |     |     | 2   | 0   |
| Queuing Penalty (veh) |     |     |     | 0   | 0   |

Queuing and Blocking Report  
2025 Background AM Peak

01/21/2022

Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB |
|-----------------------|-----|----|
| Directions Served     | LTR | R  |
| Maximum Queue (ft)    | 160 | 38 |
| Average Queue (ft)    | 67  | 13 |
| 95th Queue (ft)       | 132 | 40 |
| Link Distance (ft)    | 332 |    |
| Upstream Blk Time (%) |     |    |
| Queuing Penalty (veh) |     |    |
| Storage Bay Dist (ft) |     | 50 |
| Storage Blk Time (%)  |     | 0  |
| Queuing Penalty (veh) |     | 0  |

Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 89 | 254  | 158 | 77  | 50  | 185 |
| Average Queue (ft)    | 17 | 92   | 77  | 31  | 11  | 93  |
| 95th Queue (ft)       | 63 | 197  | 138 | 63  | 35  | 154 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 0  | 6    |     |     |     |     |
| Queuing Penalty (veh) | 0  | 4    |     |     |     |     |

Network Summary

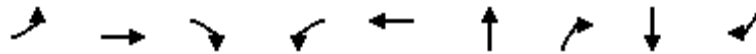
|                                   |
|-----------------------------------|
| Network wide Queuing Penalty: 291 |
|-----------------------------------|

## Queues

2025 Background PM Peak

01/21/2022

## 1: Canterbury Road /Route 846 &amp; Ivy Road



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 460  | 686  | 22   | 43   | 751  | 27   | 37   | 87   | 617  |
| v/c Ratio               | 0.90 | 0.60 | 0.02 | 0.11 | 1.04 | 0.23 | 0.12 | 0.59 | 0.91 |
| Control Delay           | 55.4 | 19.5 | 0.0  | 10.8 | 80.9 | 58.1 | 0.7  | 68.8 | 41.3 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 55.4 | 19.5 | 0.0  | 10.8 | 80.9 | 58.1 | 0.7  | 68.8 | 41.3 |
| Queue Length 50th (ft)  | 300  | 354  | 0    | 10   | ~631 | 20   | 0    | 66   | 250  |
| Queue Length 95th (ft)  | #550 | 493  | 0    | 23   | #872 | 51   | 0    | 119  | #576 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 513  | 1148 | 1045 | 394  | 722  | 139  | 337  | 187  | 680  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.90 | 0.60 | 0.02 | 0.11 | 1.04 | 0.19 | 0.11 | 0.47 | 0.91 |

## Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

2025 Background PM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 437                                                                               | 652                                                                               | 21                                                                                | 41                                                                                | 642                                                                               | 71                                                                                | 17                                                                                 | 9                                                                                   | 35                                                                                  | 66                                                                                  | 17                                                                                  | 586                                                                                 |
| Future Volume (vph)               | 437                                                                               | 652                                                                               | 21                                                                                | 41                                                                                | 642                                                                               | 71                                                                                | 17                                                                                 | 9                                                                                   | 35                                                                                  | 66                                                                                  | 17                                                                                  | 586                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.99                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1752                                                                              | 1881                                                                              | 1615                                                                              | 1752                                                                              | 1855                                                                              |                                                                                   |                                                                                    | 1757                                                                                | 1524                                                                                |                                                                                     | 1785                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.08                                                                              | 1.00                                                                              | 1.00                                                                              | 0.40                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 139                                                                               | 1881                                                                              | 1615                                                                              | 746                                                                               | 1855                                                                              |                                                                                   |                                                                                    | 1757                                                                                | 1524                                                                                |                                                                                     | 1785                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                               | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                |
| Adj. Flow (vph)                   | 460                                                                               | 686                                                                               | 22                                                                                | 43                                                                                | 676                                                                               | 75                                                                                | 18                                                                                 | 9                                                                                   | 37                                                                                  | 69                                                                                  | 18                                                                                  | 617                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 3                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 35                                                                                  | 0                                                                                   | 0                                                                                   | 150                                                                                 |
| Lane Group Flow (vph)             | 460                                                                               | 686                                                                               | 13                                                                                | 43                                                                                | 748                                                                               | 0                                                                                 | 0                                                                                  | 27                                                                                  | 2                                                                                   | 0                                                                                   | 87                                                                                  | 467                                                                                 |
| Heavy Vehicles (%)                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 7%                                                                                 | 0%                                                                                  | 6%                                                                                  | 3%                                                                                  | 0%                                                                                  | 2%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                              | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 83.9                                                                              | 70.4                                                                              | 70.4                                                                              | 50.9                                                                              | 45.2                                                                              |                                                                                   |                                                                                    | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 10.0                                                                                | 40.9                                                                                |
| Effective Green, g (s)            | 83.9                                                                              | 70.4                                                                              | 70.4                                                                              | 50.9                                                                              | 45.2                                                                              |                                                                                   |                                                                                    | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 10.0                                                                                | 40.9                                                                                |
| Actuated g/C Ratio                | 0.70                                                                              | 0.59                                                                              | 0.59                                                                              | 0.42                                                                              | 0.38                                                                              |                                                                                   |                                                                                    | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.08                                                                                | 0.34                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 512                                                                               | 1103                                                                              | 947                                                                               | 364                                                                               | 698                                                                               |                                                                                   |                                                                                    | 93                                                                                  | 81                                                                                  |                                                                                     | 148                                                                                 | 539                                                                                 |
| v/s Ratio Prot                    | c0.23                                                                             | 0.36                                                                              |                                                                                   | 0.01                                                                              | c0.40                                                                             |                                                                                   |                                                                                    | c0.02                                                                               |                                                                                     |                                                                                     | 0.05                                                                                | c0.22                                                                               |
| v/s Ratio Perm                    | 0.40                                                                              |                                                                                   | 0.01                                                                              | 0.04                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.07                                                                                |
| v/c Ratio                         | 0.90                                                                              | 0.62                                                                              | 0.01                                                                              | 0.12                                                                              | 1.07                                                                              |                                                                                   |                                                                                    | 0.29                                                                                | 0.02                                                                                |                                                                                     | 0.59                                                                                | 0.87                                                                                |
| Uniform Delay, d1                 | 35.9                                                                              | 16.1                                                                              | 10.3                                                                              | 20.4                                                                              | 37.4                                                                              |                                                                                   |                                                                                    | 54.6                                                                                | 53.8                                                                                |                                                                                     | 53.0                                                                                | 37.0                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 17.9                                                                              | 2.6                                                                               | 0.0                                                                               | 0.1                                                                               | 54.8                                                                              |                                                                                   |                                                                                    | 0.6                                                                                 | 0.0                                                                                 |                                                                                     | 3.8                                                                                 | 13.2                                                                                |
| Delay (s)                         | 53.8                                                                              | 18.8                                                                              | 10.4                                                                              | 20.4                                                                              | 92.2                                                                              |                                                                                   |                                                                                    | 55.2                                                                                | 53.9                                                                                |                                                                                     | 56.8                                                                                | 50.2                                                                                |
| Level of Service                  | D                                                                                 | B                                                                                 | B                                                                                 | C                                                                                 | F                                                                                 |                                                                                   |                                                                                    | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   |
| Approach Delay (s)                |                                                                                   | 32.4                                                                              |                                                                                   |                                                                                   | 88.3                                                                              |                                                                                   |                                                                                    | 54.5                                                                                |                                                                                     |                                                                                     | 51.0                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 54.0                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 99.5%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

2025 Background PM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 36                                                                                | 22                                                                                | 57                                                                                | 57                                                                                | 0                                                                                 | 30                                                                                  | 0                                                                                   | 478                                                                                 | 9                                                                                   | 606                                                                                 | 15                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 36                                                                                | 22                                                                                | 57                                                                                | 57                                                                                | 0                                                                                 | 30                                                                                  | 0                                                                                   | 478                                                                                 | 9                                                                                   | 606                                                                                 | 15                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 38                                                                                | 23                                                                                | 61                                                                                | 61                                                                                | 0                                                                                 | 32                                                                                  | 0                                                                                   | 509                                                                                 | 10                                                                                  | 645                                                                                 | 16                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage veh                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.85                                                                              | 0.85                                                                              |                                                                                   | 0.85                                                                              | 0.85                                                                              | 0.85                                                                              |                                                                                     |                                                                                     |                                                                                     | 0.85                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1022                                                                              | 1246                                                                              | 653                                                                               | 1034                                                                              | 1000                                                                              | 254                                                                               | 661                                                                                 |                                                                                     |                                                                                     | 509                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 939                                                                               | 1202                                                                              | 653                                                                               | 953                                                                               | 913                                                                               | 39                                                                                | 661                                                                                 |                                                                                     |                                                                                     | 338                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 75                                                                                | 95                                                                                | 60                                                                                | 73                                                                                | 100                                                                               | 97                                                                                  |                                                                                     |                                                                                     | 99                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 161                                                                               | 152                                                                               | 462                                                                               | 151                                                                               | 225                                                                               | 885                                                                               | 937                                                                                 |                                                                                     |                                                                                     | 1051                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 61                                                                                | 122                                                                               | 541                                                                               | 671                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 61                                                                                | 32                                                                                | 10                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 23                                                                                | 0                                                                                 | 509                                                                               | 16                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 203                                                                               | 181                                                                               | 937                                                                               | 1051                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.30                                                                              | 0.67                                                                              | 0.03                                                                              | 0.01                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 30                                                                                | 101                                                                               | 3                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 30.1                                                                              | 58.5                                                                              | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | D                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 30.1                                                                              | 58.5                                                                              | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | D                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 6.9                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 69.2%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

2025 Background PM Peak

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|--|--|--|--|--|--|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |  |  |  |  |  |  |  |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)            | 36                                                                                | 515                                                                               | 1                                                                                 | 0                                                                                 | 113                                                                               | 22                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 151                                                                                 | 0                                                                                   | 15                                                                                  |  |  |  |  |  |  |  |
| Future Volume (Veh/h)             | 36                                                                                | 515                                                                               | 1                                                                                 | 0                                                                                 | 113                                                                               | 22                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 151                                                                                 | 0                                                                                   | 15                                                                                  |  |  |  |  |  |  |  |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |  |  |  |  |  |  |  |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |  |  |  |  |  |  |  |
| Peak Hour Factor                  | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                |  |  |  |  |  |  |  |
| Hourly flow rate (vph)            | 38                                                                                | 536                                                                               | 1                                                                                 | 0                                                                                 | 118                                                                               | 23                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 157                                                                                 | 0                                                                                   | 16                                                                                  |  |  |  |  |  |  |  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 8                                                                                   |  |  |  |  |  |  |  |
| Median type                       | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | None                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| vC, conflicting volume            | 141                                                                               |                                                                                   |                                                                                   | 537                                                                               |                                                                                   |                                                                                   | 750                                                                                 | 753                                                                                 | 536                                                                                 | 748                                                                                 | 742                                                                                 | 130                                                                                 |  |  |  |  |  |  |  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| vCu, unblocked vol                | 141                                                                               |                                                                                   |                                                                                   | 537                                                                               |                                                                                   |                                                                                   | 750                                                                                 | 753                                                                                 | 536                                                                                 | 748                                                                                 | 742                                                                                 | 130                                                                                 |  |  |  |  |  |  |  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |  |  |  |  |  |  |  |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |  |  |  |  |  |  |  |
| p0 queue free %                   | 97                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 99                                                                                  | 51                                                                                  | 100                                                                                 | 98                                                                                  |  |  |  |  |  |  |  |
| cM capacity (veh/h)               | 1455                                                                              |                                                                                   |                                                                                   | 1041                                                                              |                                                                                   |                                                                                   | 318                                                                                 | 332                                                                                 | 549                                                                                 | 319                                                                                 | 337                                                                                 | 926                                                                                 |  |  |  |  |  |  |  |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Volume Total                      | 574                                                                               | 1                                                                                 | 141                                                                               | 8                                                                                 | 173                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Volume Left                       | 38                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 157                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Volume Right                      | 0                                                                                 | 1                                                                                 | 23                                                                                | 7                                                                                 | 16                                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| cSH                               | 1455                                                                              | 1700                                                                              | 1041                                                                              | 503                                                                               | 351                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Volume to Capacity                | 0.03                                                                              | 0.00                                                                              | 0.00                                                                              | 0.02                                                                              | 0.49                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Queue Length 95th (ft)            | 2                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 65                                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Control Delay (s)                 | 0.8                                                                               | 0.0                                                                               | 0.0                                                                               | 12.3                                                                              | 25.1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 | D                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Approach Delay (s)                | 0.8                                                                               |                                                                                   | 0.0                                                                               | 12.3                                                                              | 25.1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | B                                                                                 | D                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Average Delay                     |                                                                                   |                                                                                   | 5.4                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.4%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |  |  |  |  |  |  |

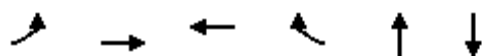
# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

2025 Background PM Peak

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                    |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 477                                                                               | 161                                                                               | 0                                                                                 | 0                                                                                 | 130                                                                               | 232                                                                               | 0                                                                                  | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 477                                                                               | 161                                                                               | 0                                                                                 | 0                                                                                 | 130                                                                               | 232                                                                               | 0                                                                                  | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.92                                                                               | 0.93                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 513                                                                               | 173                                                                               | 0                                                                                 | 0                                                                                 | 140                                                                               | 249                                                                               | 0                                                                                  | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 389                                                                               |                                                                                   |                                                                                   | 173                                                                               |                                                                                   |                                                                                   | 1339                                                                               | 1588                                                                                | 173                                                                                 | 1340                                                                                | 1339                                                                                | 140                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 389                                                                               |                                                                                   |                                                                                   | 173                                                                               |                                                                                   |                                                                                   | 1339                                                                               | 1588                                                                                | 173                                                                                 | 1340                                                                                | 1339                                                                                | 140                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 56                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                | 98                                                                                  | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1170                                                                              |                                                                                   |                                                                                   | 1416                                                                              |                                                                                   |                                                                                   | 85                                                                                 | 61                                                                                  | 871                                                                                 | 84                                                                                  | 86                                                                                  | 908                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 686                                                                               | 140                                                                               | 249                                                                               | 1                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 513                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 0                                                                                 | 249                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1170                                                                              | 1416                                                                              | 1700                                                                              | 61                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.44                                                                              | 0.00                                                                              | 0.15                                                                              | 0.02                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 57                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.1                                                                               | 0.0                                                                               | 0.0                                                                               | 64.8                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.1                                                                               | 0.0                                                                               |                                                                                   | 64.8                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.9                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 46   | 536  | 750  | 297  | 18   | 211  |
| v/c Ratio               | 0.20 | 0.51 | 0.70 | 0.29 | 0.07 | 0.55 |
| Control Delay           | 11.0 | 10.9 | 15.8 | 2.5  | 0.5  | 15.5 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 11.0 | 10.9 | 15.8 | 2.5  | 0.5  | 15.5 |
| Queue Length 50th (ft)  | 5    | 78   | 129  | 1    | 0    | 22   |
| Queue Length 95th (ft)  | 34   | 260  | #481 | 41   | 0    | 83   |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 233  | 1056 | 1066 | 1029 | 690  | 684  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.20 | 0.51 | 0.70 | 0.29 | 0.03 | 0.31 |

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

2025 Background PM Peak

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 42                                                                                | 493                                                                               | 0                                                                                 | 0                                                                                 | 690                                                                               | 273                                                                               | 14                                                                                  | 0                                                                                   | 3                                                                                   | 139                                                                                 | 0                                                                                   | 55                                                                                  |
| Future Volume (vph)               | 42                                                                                | 493                                                                               | 0                                                                                 | 0                                                                                 | 690                                                                               | 273                                                                               | 14                                                                                  | 0                                                                                   | 3                                                                                   | 139                                                                                 | 0                                                                                   | 55                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 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                                                                              |                                                                                     | 0.98                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1783                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Flt Permitted                     | 0.22                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 412                                                                               | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1783                                                                                |                                                                                     |                                                                                     | 1764                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 46                                                                                | 536                                                                               | 0                                                                                 | 0                                                                                 | 750                                                                               | 297                                                                               | 15                                                                                  | 0                                                                                   | 3                                                                                   | 151                                                                                 | 0                                                                                   | 60                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 137                                                                               | 0                                                                                   | 18                                                                                  | 0                                                                                   | 0                                                                                   | 110                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 46                                                                                | 536                                                                               | 0                                                                                 | 0                                                                                 | 750                                                                               | 160                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 101                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 2%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                   | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 30.4                                                                              | 30.4                                                                              |                                                                                   |                                                                                   | 30.4                                                                              | 30.4                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 8.4                                                                                 |                                                                                     |
| Effective Green, g (s)            | 30.4                                                                              | 30.4                                                                              |                                                                                   |                                                                                   | 30.4                                                                              | 30.4                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 8.4                                                                                 |                                                                                     |
| Actuated g/C Ratio                | 0.52                                                                              | 0.52                                                                              |                                                                                   |                                                                                   | 0.52                                                                              | 0.52                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.14                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                     | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 214                                                                               | 968                                                                               |                                                                                   |                                                                                   | 977                                                                               | 830                                                                               |                                                                                     | 21                                                                                  |                                                                                     |                                                                                     | 253                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                   | c0.40                                                                             |                                                                                   |                                                                                     | c0.00                                                                               |                                                                                     |                                                                                     | c0.06                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.11                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.10                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.21                                                                              | 0.55                                                                              |                                                                                   |                                                                                   | 0.77                                                                              | 0.19                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.40                                                                                |                                                                                     |
| Uniform Delay, d1                 | 7.6                                                                               | 9.5                                                                               |                                                                                   |                                                                                   | 11.2                                                                              | 7.5                                                                               |                                                                                     | 28.6                                                                                |                                                                                     |                                                                                     | 22.8                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.7                                                                               | 0.9                                                                               |                                                                                   |                                                                                   | 3.9                                                                               | 0.2                                                                               |                                                                                     | 0.1                                                                                 |                                                                                     |                                                                                     | 1.0                                                                                 |                                                                                     |
| Delay (s)                         | 8.3                                                                               | 10.3                                                                              |                                                                                   |                                                                                   | 15.1                                                                              | 7.7                                                                               |                                                                                     | 28.6                                                                                |                                                                                     |                                                                                     | 23.8                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 10.2                                                                              |                                                                                   |                                                                                   | 13.0                                                                              |                                                                                   |                                                                                     | 28.6                                                                                |                                                                                     |                                                                                     | 23.8                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 13.5                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.68                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 58.5                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 61.7%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Queuing and Blocking Report  
2025 Background PM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 609 | 415 | 31  | 200 | 620 | 82  | 66  | 214 | 76 |
| Average Queue (ft)    | 302 | 175 | 4   | 49  | 561 | 24  | 17  | 201 | 74 |
| 95th Queue (ft)       | 575 | 373 | 20  | 164 | 727 | 60  | 44  | 226 | 77 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) | 0   | 0   |     |     | 47  |     |     | 27  |    |
| Queuing Penalty (veh) | 0   | 0   |     |     | 0   |     |     | 185 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     |     |     | 0   | 55  |     |     | 25  | 37 |
| Queuing Penalty (veh) |     |     |     | 1   | 23  |     |     | 146 | 31 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 80  | 141 | 71  | 1147 |
| Average Queue (ft)    | 32  | 55  | 19  | 1103 |
| 95th Queue (ft)       | 63  | 111 | 56  | 1277 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     | 0   |     | 93   |
| Queuing Penalty (veh) |     | 0   |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LT  | R   |
| Maximum Queue (ft)    | 58  | 28  | 138 | 47  |
| Average Queue (ft)    | 6   | 6   | 54  | 13  |
| 95th Queue (ft)       | 31  | 23  | 102 | 42  |
| Link Distance (ft)    | 299 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     | 190 |
| Storage Blk Time (%)  |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |

# Queuing and Blocking Report

## 2025 Background PM Peak

01/21/2022

### Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB | NB  |
|-----------------------|-----|----|-----|
| Directions Served     | LTR | R  | LTR |
| Maximum Queue (ft)    | 310 | 44 | 17  |
| Average Queue (ft)    | 121 | 29 | 1   |
| 95th Queue (ft)       | 235 | 50 | 9   |
| Link Distance (ft)    | 332 |    | 193 |
| Upstream Blk Time (%) | 0   |    |     |
| Queuing Penalty (veh) | 1   |    |     |
| Storage Bay Dist (ft) |     | 50 |     |
| Storage Blk Time (%)  |     | 1  |     |
| Queuing Penalty (veh) |     | 1  |     |

### Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 78 | 190  | 322 | 92  | 49  | 160 |
| Average Queue (ft)    | 13 | 54   | 146 | 44  | 15  | 77  |
| 95th Queue (ft)       | 50 | 146  | 256 | 76  | 41  | 132 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 1  | 2    |     |     |     |     |
| Queuing Penalty (veh) | 4  | 1    |     |     |     |     |

### Network Summary

Network wide Queuing Penalty: 391

## **Appendix D**

# **Synchro Analysis for 2025 Total Future Conditions**

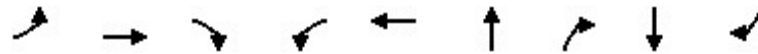
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# Queues

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 435  | 676  | 11   | 28   | 740  | 34   | 27   | 139  | 653  |
| v/c Ratio               | 0.88 | 0.59 | 0.01 | 0.07 | 1.09 | 0.27 | 0.08 | 0.79 | 0.94 |
| Control Delay           | 53.2 | 18.8 | 0.0  | 11.4 | 98.4 | 58.7 | 0.5  | 81.9 | 44.7 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 53.2 | 18.8 | 0.0  | 11.4 | 98.4 | 58.7 | 0.5  | 81.9 | 44.7 |
| Queue Length 50th (ft)  | 282  | 362  | 0    | 7    | ~663 | 26   | 0    | 105  | 240  |
| Queue Length 95th (ft)  | #498 | 499  | 0    | 18   | #904 | 60   | 0    | #196 | #651 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 496  | 1153 | 1066 | 377  | 677  | 147  | 338  | 199  | 692  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.88 | 0.59 | 0.01 | 0.07 | 1.09 | 0.23 | 0.08 | 0.70 | 0.94 |

### Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                    |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 400                                                                               | 622                                                                               | 10                                                                                | 26                                                                                | 565                                                                               | 116                                                                               | 13                                                                                 | 18                                                                                  | 25                                                                                  | 114                                                                                 | 14                                                                                  | 601                                                                                 |
| Future Volume (vph)               | 400                                                                               | 622                                                                               | 10                                                                                | 26                                                                                | 565                                                                               | 116                                                                               | 13                                                                                 | 18                                                                                  | 25                                                                                  | 114                                                                                 | 14                                                                                  | 601                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.97                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1770                                                                              | 1845                                                                              | 1615                                                                              | 1736                                                                              | 1758                                                                              |                                                                                   |                                                                                    | 1862                                                                                | 1538                                                                                |                                                                                     | 1756                                                                                | 1553                                                                                |
| Flt Permitted                     | 0.08                                                                              | 1.00                                                                              | 1.00                                                                              | 0.41                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 0.98                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 142                                                                               | 1845                                                                              | 1615                                                                              | 745                                                                               | 1758                                                                              |                                                                                   |                                                                                    | 1862                                                                                | 1538                                                                                |                                                                                     | 1756                                                                                | 1553                                                                                |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 435                                                                               | 676                                                                               | 11                                                                                | 28                                                                                | 614                                                                               | 126                                                                               | 14                                                                                 | 20                                                                                  | 27                                                                                  | 124                                                                                 | 15                                                                                  | 653                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 6                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 26                                                                                  | 0                                                                                   | 0                                                                                   | 166                                                                                 |
| Lane Group Flow (vph)             | 435                                                                               | 676                                                                               | 6                                                                                 | 28                                                                                | 734                                                                               | 0                                                                                 | 0                                                                                  | 34                                                                                  | 1                                                                                   | 0                                                                                   | 139                                                                                 | 487                                                                                 |
| Heavy Vehicles (%)                | 2%                                                                                | 3%                                                                                | 0%                                                                                | 4%                                                                                | 6%                                                                                | 2%                                                                                | 0%                                                                                 | 0%                                                                                  | 5%                                                                                  | 4%                                                                                  | 0%                                                                                  | 4%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                              | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 81.7                                                                              | 70.6                                                                              | 70.6                                                                              | 47.9                                                                              | 44.6                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 12.1                                                                                | 41.4                                                                                |
| Effective Green, g (s)            | 81.7                                                                              | 70.6                                                                              | 70.6                                                                              | 47.9                                                                              | 44.6                                                                              |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 12.1                                                                                | 41.4                                                                                |
| Actuated g/C Ratio                | 0.68                                                                              | 0.59                                                                              | 0.59                                                                              | 0.40                                                                              | 0.37                                                                              |                                                                                   |                                                                                    | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.10                                                                                | 0.34                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                    | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                    | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 494                                                                               | 1085                                                                              | 950                                                                               | 324                                                                               | 653                                                                               |                                                                                   |                                                                                    | 100                                                                                 | 83                                                                                  |                                                                                     | 177                                                                                 | 535                                                                                 |
| v/s Ratio Prot                    | 0.21                                                                              | 0.37                                                                              |                                                                                   | 0.00                                                                              | c0.42                                                                             |                                                                                   |                                                                                    | c0.02                                                                               |                                                                                     |                                                                                     | 0.08                                                                                | c0.22                                                                               |
| v/s Ratio Perm                    | 0.38                                                                              |                                                                                   | 0.00                                                                              | 0.03                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.09                                                                                |
| v/c Ratio                         | 0.88                                                                              | 0.62                                                                              | 0.01                                                                              | 0.09                                                                              | 1.12                                                                              |                                                                                   |                                                                                    | 0.34                                                                                | 0.02                                                                                |                                                                                     | 0.79                                                                                | 0.91                                                                                |
| Uniform Delay, d1                 | 35.9                                                                              | 16.1                                                                              | 10.2                                                                              | 22.0                                                                              | 37.7                                                                              |                                                                                   |                                                                                    | 54.7                                                                                | 53.7                                                                                |                                                                                     | 52.7                                                                                | 37.5                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                    | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 16.2                                                                              | 2.7                                                                               | 0.0                                                                               | 0.0                                                                               | 74.4                                                                              |                                                                                   |                                                                                    | 0.7                                                                                 | 0.0                                                                                 |                                                                                     | 18.7                                                                                | 19.4                                                                                |
| Delay (s)                         | 52.1                                                                              | 18.8                                                                              | 10.2                                                                              | 22.1                                                                              | 112.1                                                                             |                                                                                   |                                                                                    | 55.4                                                                                | 53.8                                                                                |                                                                                     | 71.4                                                                                | 56.9                                                                                |
| Level of Service                  | D                                                                                 | B                                                                                 | B                                                                                 | C                                                                                 | F                                                                                 |                                                                                   |                                                                                    | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | E                                                                                   |
| Approach Delay (s)                |                                                                                   | 31.6                                                                              |                                                                                   |                                                                                   | 108.8                                                                             |                                                                                   |                                                                                    | 54.7                                                                                |                                                                                     |                                                                                     | 59.5                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 61.8                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.97                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 99.1%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | F                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 68                                                                                | 34                                                                                | 97                                                                                | 18                                                                                | 0                                                                                 | 21                                                                                  | 0                                                                                   | 513                                                                                 | 54                                                                                  | 607                                                                                 | 41                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 68                                                                                | 34                                                                                | 97                                                                                | 18                                                                                | 0                                                                                 | 21                                                                                  | 0                                                                                   | 513                                                                                 | 54                                                                                  | 607                                                                                 | 41                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 74                                                                                | 37                                                                                | 105                                                                               | 20                                                                                | 0                                                                                 | 23                                                                                  | 0                                                                                   | 558                                                                                 | 59                                                                                  | 660                                                                                 | 45                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 283                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.87                                                                              | 0.87                                                                              |                                                                                   | 0.87                                                                              | 0.87                                                                              | 0.87                                                                              |                                                                                     |                                                                                     |                                                                                     | 0.87                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1136                                                                              | 1404                                                                              | 682                                                                               | 1200                                                                              | 1148                                                                              | 279                                                                               | 705                                                                                 |                                                                                     |                                                                                     | 558                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 1079                                                                              | 1390                                                                              | 682                                                                               | 1153                                                                              | 1093                                                                              | 89                                                                                | 705                                                                                 |                                                                                     |                                                                                     | 411                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.2                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.6                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 35                                                                                | 92                                                                                | 0                                                                                 | 88                                                                                | 100                                                                               | 97                                                                                  |                                                                                     |                                                                                     | 94                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 146                                                                               | 114                                                                               | 453                                                                               | 60                                                                                | 171                                                                               | 843                                                                               | 902                                                                                 |                                                                                     |                                                                                     | 1002                                                                                |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 111                                                                               | 125                                                                               | 581                                                                               | 764                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 105                                                                               | 23                                                                                | 59                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 37                                                                                | 0                                                                                 | 558                                                                               | 45                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 152                                                                               | 67                                                                                | 902                                                                               | 1002                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.73                                                                              | 1.86                                                                              | 0.03                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 110                                                                               | 284                                                                               | 2                                                                                 | 5                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 75.1                                                                              | 538.1                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | F                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 75.1                                                                              | 538.1                                                                             | 0.7                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | F                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 48.8                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (veh/h)            | 122                                                                               | 512                                                                               | 11                                                                                | 0                                                                                 | 108                                                                               | 39                                                                                | 3                                                                                   | 1                                                                                   | 0                                                                                   | 239                                                                                 | 4                                                                                   | 4                                                                                   |
| Future Volume (Veh/h)             | 122                                                                               | 512                                                                               | 11                                                                                | 0                                                                                 | 108                                                                               | 39                                                                                | 3                                                                                   | 1                                                                                   | 0                                                                                   | 239                                                                                 | 4                                                                                   | 4                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 133                                                                               | 557                                                                               | 12                                                                                | 0                                                                                 | 117                                                                               | 42                                                                                | 3                                                                                   | 1                                                                                   | 0                                                                                   | 260                                                                                 | 4                                                                                   | 4                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 159                                                                               |                                                                                   |                                                                                   | 569                                                                               |                                                                                   |                                                                                   | 965                                                                                 | 982                                                                                 | 557                                                                                 | 962                                                                                 | 973                                                                                 | 138                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 159                                                                               |                                                                                   |                                                                                   | 569                                                                               |                                                                                   |                                                                                   | 965                                                                                 | 982                                                                                 | 557                                                                                 | 962                                                                                 | 973                                                                                 | 138                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 91                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 99                                                                                  | 100                                                                                 | 100                                                                                 | 0                                                                                   | 98                                                                                  | 100                                                                                 |
| cM capacity (veh/h)               | 1433                                                                              |                                                                                   |                                                                                   | 1013                                                                              |                                                                                   |                                                                                   | 216                                                                                 | 228                                                                                 | 534                                                                                 | 217                                                                                 | 231                                                                                 | 916                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 690                                                                               | 12                                                                                | 159                                                                               | 4                                                                                 | 268                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 133                                                                               | 0                                                                                 | 0                                                                                 | 3                                                                                 | 260                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 12                                                                                | 42                                                                                | 0                                                                                 | 4                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1433                                                                              | 1700                                                                              | 1013                                                                              | 219                                                                               | 220                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.09                                                                              | 0.01                                                                              | 0.00                                                                              | 0.02                                                                              | 1.22                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 8                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 336                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 2.4                                                                               | 0.0                                                                               | 0.0                                                                               | 21.8                                                                              | 176.1                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 2.3                                                                               |                                                                                   | 0.0                                                                               | 21.8                                                                              | 176.1                                                                             |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | C                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 43.2                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 68.1%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

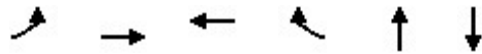
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|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 438                                                                               | 311                                                                               | 1                                                                                 | 0                                                                                 | 147                                                                               | 165                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 438                                                                               | 311                                                                               | 1                                                                                 | 0                                                                                 | 147                                                                               | 165                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 476                                                                               | 338                                                                               | 1                                                                                 | 0                                                                                 | 160                                                                               | 179                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 339                                                                               |                                                                                   |                                                                                   | 339                                                                               |                                                                                   |                                                                                   | 1450                                                                                | 1630                                                                                | 338                                                                                 | 1450                                                                                | 1451                                                                                | 160                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 339                                                                               |                                                                                   |                                                                                   | 339                                                                               |                                                                                   |                                                                                   | 1450                                                                                | 1630                                                                                | 338                                                                                 | 1450                                                                                | 1451                                                                                | 160                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 61                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1220                                                                              |                                                                                   |                                                                                   | 1231                                                                              |                                                                                   |                                                                                   | 76                                                                                  | 62                                                                                  | 704                                                                                 | 76                                                                                  | 80                                                                                  | 885                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 815                                                                               | 160                                                                               | 179                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 476                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 1                                                                                 | 0                                                                                 | 179                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1220                                                                              | 1231                                                                              | 1700                                                                              | 1700                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.39                                                                              | 0.00                                                                              | 0.11                                                                              | 0.00                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 47                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 7.7                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 7.7                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 5.5                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 57.6%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## Queues

## 5: Commerical Entrance/Old Ivy Road &amp; Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 75   | 678  | 363  | 175  | 12   | 335  |
| v/c Ratio               | 0.14 | 0.69 | 0.37 | 0.19 | 0.08 | 0.71 |
| Control Delay           | 10.7 | 17.8 | 11.5 | 2.9  | 28.9 | 22.4 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 10.7 | 17.8 | 11.5 | 2.9  | 28.9 | 22.4 |
| Queue Length 50th (ft)  | 11   | 144  | 61   | 0    | 4    | 60   |
| Queue Length 95th (ft)  | 48   | #475 | 189  | 34   | 21   | 166  |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 523  | 988  | 969  | 898  | 561  | 632  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.14 | 0.69 | 0.37 | 0.19 | 0.02 | 0.53 |

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

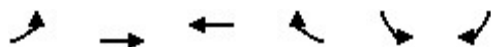
01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (vph)              | 69                                                                                | 624                                                                               | 0                                                                                 | 0                                                                                 | 334                                                                               | 161                                                                               | 10                                                                                 | 1                                                                                   | 0                                                                                   | 274                                                                                 | 0                                                                                   | 34                                                                                  |
| Future Volume (vph)               | 69                                                                                | 624                                                                               | 0                                                                                 | 0                                                                                 | 334                                                                               | 161                                                                               | 10                                                                                 | 1                                                                                   | 0                                                                                   | 274                                                                                 | 0                                                                                   | 34                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                               | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                    | 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                                                                                |                                                                                     |                                                                                     | 0.99                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                    | 1781                                                                                |                                                                                     |                                                                                     | 1730                                                                                |                                                                                     |
| Flt Permitted                     | 0.52                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 995                                                                               | 1881                                                                              |                                                                                   |                                                                                   | 1845                                                                              | 1553                                                                              |                                                                                    | 1781                                                                                |                                                                                     |                                                                                     | 1730                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 75                                                                                | 678                                                                               | 0                                                                                 | 0                                                                                 | 363                                                                               | 175                                                                               | 11                                                                                 | 1                                                                                   | 0                                                                                   | 298                                                                                 | 0                                                                                   | 37                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 90                                                                                | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 103                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 75                                                                                | 678                                                                               | 0                                                                                 | 0                                                                                 | 363                                                                               | 85                                                                                | 0                                                                                  | 12                                                                                  | 0                                                                                   | 0                                                                                   | 232                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 1%                                                                                | 0%                                                                                | 0%                                                                                | 3%                                                                                | 4%                                                                                | 2%                                                                                 | 2%                                                                                  | 2%                                                                                  | 4%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                              | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 30.5                                                                              | 30.5                                                                              |                                                                                   |                                                                                   | 30.5                                                                              | 30.5                                                                              |                                                                                    | 1.0                                                                                 |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Effective Green, g (s)            | 30.5                                                                              | 30.5                                                                              |                                                                                   |                                                                                   | 30.5                                                                              | 30.5                                                                              |                                                                                    | 1.0                                                                                 |                                                                                     |                                                                                     | 12.4                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.48                                                                              | 0.48                                                                              |                                                                                   |                                                                                   | 0.48                                                                              | 0.48                                                                              |                                                                                    | 0.02                                                                                |                                                                                     |                                                                                     | 0.20                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                    | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 482                                                                               | 912                                                                               |                                                                                   |                                                                                   | 894                                                                               | 753                                                                               |                                                                                    | 28                                                                                  |                                                                                     |                                                                                     | 341                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | c0.36                                                                             |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                    | c0.01                                                                               |                                                                                     |                                                                                     | c0.13                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.08                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.05                                                                              |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.16                                                                              | 0.74                                                                              |                                                                                   |                                                                                   | 0.41                                                                              | 0.11                                                                              |                                                                                    | 0.43                                                                                |                                                                                     |                                                                                     | 0.68                                                                                |                                                                                     |
| Uniform Delay, d1                 | 9.0                                                                               | 13.0                                                                              |                                                                                   |                                                                                   | 10.4                                                                              | 8.8                                                                               |                                                                                    | 30.7                                                                                |                                                                                     |                                                                                     | 23.4                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                    | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.2                                                                               | 3.5                                                                               |                                                                                   |                                                                                   | 0.4                                                                               | 0.1                                                                               |                                                                                    | 3.8                                                                                 |                                                                                     |                                                                                     | 5.5                                                                                 |                                                                                     |
| Delay (s)                         | 9.2                                                                               | 16.6                                                                              |                                                                                   |                                                                                   | 10.8                                                                              | 8.9                                                                               |                                                                                    | 34.5                                                                                |                                                                                     |                                                                                     | 28.9                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 15.8                                                                              |                                                                                   |                                                                                   | 10.2                                                                              |                                                                                   |                                                                                    | 34.5                                                                                |                                                                                     |                                                                                     | 28.9                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                    | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 16.8                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                          |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 62.9                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                               |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                               |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 6: Old Ivy Road & Site Entrance

01/21/2022



| Movement                          | EBL  | EBT  | WBT   | WBR  | SBL                  | SBR  |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations               |      |      |       |      |                      |      |
| Traffic Volume (veh/h)            | 40   | 271  | 204   | 27   | 87                   | 130  |
| Future Volume (Veh/h)             | 40   | 271  | 204   | 27   | 87                   | 130  |
| Sign Control                      |      | Free | Free  |      | Stop                 |      |
| Grade                             |      | 0%   | 0%    |      | 0%                   |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 43   | 295  | 222   | 29   | 95                   | 141  |
| 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            | 251  |      |       |      | 603                  | 222  |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 251  |      |       |      | 603                  | 222  |
| tC, single (s)                    | 4.1  |      |       |      | 6.4                  | 6.2  |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 2.2  |      |       |      | 3.5                  | 3.3  |
| p0 queue free %                   | 97   |      |       |      | 79                   | 83   |
| cM capacity (veh/h)               | 1314 |      |       |      | 447                  | 818  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2 | SB 1                 |      |
| Volume Total                      | 43   | 295  | 222   | 29   | 236                  |      |
| Volume Left                       | 43   | 0    | 0     | 0    | 95                   |      |
| Volume Right                      | 0    | 0    | 0     | 29   | 141                  |      |
| cSH                               | 1314 | 1700 | 1700  | 1700 | 613                  |      |
| Volume to Capacity                | 0.03 | 0.17 | 0.13  | 0.02 | 0.39                 |      |
| Queue Length 95th (ft)            | 3    | 0    | 0     | 0    | 45                   |      |
| Control Delay (s)                 | 7.8  | 0.0  | 0.0   | 0.0  | 14.5                 |      |
| Lane LOS                          | A    |      |       |      | B                    |      |
| Approach Delay (s)                | 1.0  |      | 0.0   |      | 14.5                 |      |
| Approach LOS                      |      |      |       |      | B                    |      |
| <b>Intersection Summary</b>       |      |      |       |      |                      |      |
| Average Delay                     |      |      | 4.6   |      |                      |      |
| Intersection Capacity Utilization |      |      | 36.9% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |

Queuing and Blocking Report  
2025 Total AM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 453 | 386 | 26  | 199 | 640 | 68  | 43  | 214 | 75 |
| Average Queue (ft)    | 226 | 152 | 2   | 34  | 582 | 27  | 12  | 189 | 73 |
| 95th Queue (ft)       | 392 | 292 | 16  | 134 | 713 | 60  | 32  | 248 | 82 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) |     |     |     |     | 51  |     |     | 22  |    |
| Queuing Penalty (veh) |     |     |     |     | 0   |     |     | 159 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     | 0   |     | 0   | 57  |     |     | 30  | 24 |
| Queuing Penalty (veh) |     | 0   |     | 0   | 15  |     |     | 180 | 31 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 117 | 149 | 69  | 1163 |
| Average Queue (ft)    | 50  | 60  | 21  | 1129 |
| 95th Queue (ft)       | 99  | 116 | 60  | 1150 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     |     |     | 100  |
| Queuing Penalty (veh) |     |     |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LTR | LT  | R   |
| Maximum Queue (ft)    | 89  | 3   | 25  | 268 | 41  |
| Average Queue (ft)    | 20  | 0   | 4   | 115 | 5   |
| 95th Queue (ft)       | 64  | 3   | 18  | 235 | 34  |
| Link Distance (ft)    | 299 | 332 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     |     | 2   |     |
| Queuing Penalty (veh) |     |     |     | 0   |     |
| Storage Bay Dist (ft) |     |     |     |     | 190 |
| Storage Blk Time (%)  | 0   |     |     | 6   | 0   |
| Queuing Penalty (veh) | 0   |     |     | 0   | 0   |

## Queuing and Blocking Report

### 2025 Total AM Peak

01/21/2022

#### Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB  |
|-----------------------|-----|-----|
| Directions Served     | LTR | R   |
| Maximum Queue (ft)    | 198 | 39  |
| Average Queue (ft)    | 86  | 6   |
| 95th Queue (ft)       | 159 | 22  |
| Link Distance (ft)    | 332 |     |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) |     | 250 |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

#### Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 85 | 320  | 206 | 71  | 40  | 238 |
| Average Queue (ft)    | 16 | 107  | 82  | 35  | 11  | 126 |
| 95th Queue (ft)       | 59 | 241  | 151 | 61  | 34  | 207 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 0  | 8    |     |     |     |     |
| Queuing Penalty (veh) | 0  | 6    |     |     |     |     |

#### Intersection: 6: Old Ivy Road & Site Entrance

| Movement              | EB  | SB  |
|-----------------------|-----|-----|
| Directions Served     | L   | LR  |
| Maximum Queue (ft)    | 44  | 103 |
| Average Queue (ft)    | 8   | 50  |
| 95th Queue (ft)       | 31  | 83  |
| Link Distance (ft)    |     | 414 |
| Upstream Blk Time (%) |     |     |
| Queuing Penalty (veh) |     |     |
| Storage Bay Dist (ft) | 150 |     |
| Storage Blk Time (%)  |     |     |
| Queuing Penalty (veh) |     |     |

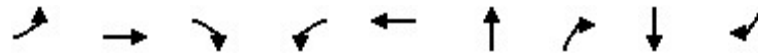
#### Network Summary

Network wide Queuing Penalty: 391

## Queues

### 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | EBR  | WBL  | WBT  | NBT  | NBR  | SBT  | SBR  |
|-------------------------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 495  | 686  | 22   | 43   | 785  | 27   | 37   | 107  | 637  |
| v/c Ratio               | 0.97 | 0.60 | 0.02 | 0.11 | 1.10 | 0.23 | 0.12 | 0.68 | 0.93 |
| Control Delay           | 70.3 | 19.7 | 0.0  | 11.0 | 99.5 | 58.1 | 0.7  | 74.0 | 45.4 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 70.3 | 19.7 | 0.0  | 11.0 | 99.5 | 58.1 | 0.7  | 74.0 | 45.4 |
| Queue Length 50th (ft)  | ~376 | 358  | 0    | 10   | ~687 | 20   | 0    | 81   | ~267 |
| Queue Length 95th (ft)  | #611 | 493  | 0    | 23   | #930 | 51   | 0    | 141  | #653 |
| Internal Link Dist (ft) |      | 843  |      |      | 543  | 551  |      | 203  |      |
| Turn Bay Length (ft)    |      |      | 450  | 200  |      |      | 180  |      | 75   |
| Base Capacity (vph)     | 508  | 1143 | 1041 | 387  | 714  | 139  | 337  | 186  | 682  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.97 | 0.60 | 0.02 | 0.11 | 1.10 | 0.19 | 0.11 | 0.58 | 0.93 |

#### Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Canterbury Road /Route 846 & Ivy Road

01/21/2022

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |                                                                                     |  |  |                                                                                     |  |  |
| Traffic Volume (vph)              | 470                                                                               | 652                                                                               | 21                                                                                | 41                                                                                | 642                                                                               | 104                                                                               | 17                                                                                  | 9                                                                                   | 35                                                                                  | 85                                                                                  | 17                                                                                  | 605                                                                                 |
| Future Volume (vph)               | 470                                                                               | 652                                                                               | 21                                                                                | 41                                                                                | 642                                                                               | 104                                                                               | 17                                                                                  | 9                                                                                   | 35                                                                                  | 85                                                                                  | 17                                                                                  | 605                                                                                 |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                     | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 0.98                                                                              |                                                                                   |                                                                                     | 1.00                                                                                | 0.85                                                                                |                                                                                     | 1.00                                                                                | 0.85                                                                                |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (prot)                 | 1752                                                                              | 1881                                                                              | 1615                                                                              | 1752                                                                              | 1845                                                                              |                                                                                   |                                                                                     | 1757                                                                                | 1524                                                                                |                                                                                     | 1780                                                                                | 1583                                                                                |
| Flt Permitted                     | 0.08                                                                              | 1.00                                                                              | 1.00                                                                              | 0.40                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 0.97                                                                                | 1.00                                                                                |                                                                                     | 0.96                                                                                | 1.00                                                                                |
| Satd. Flow (perm)                 | 140                                                                               | 1881                                                                              | 1615                                                                              | 746                                                                               | 1845                                                                              |                                                                                   |                                                                                     | 1757                                                                                | 1524                                                                                |                                                                                     | 1780                                                                                | 1583                                                                                |
| Peak-hour factor, PHF             | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                              | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                | 0.95                                                                                |
| Adj. Flow (vph)                   | 495                                                                               | 686                                                                               | 22                                                                                | 43                                                                                | 676                                                                               | 109                                                                               | 18                                                                                  | 9                                                                                   | 37                                                                                  | 89                                                                                  | 18                                                                                  | 637                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 9                                                                                 | 0                                                                                 | 5                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 35                                                                                  | 0                                                                                   | 0                                                                                   | 149                                                                                 |
| Lane Group Flow (vph)             | 495                                                                               | 686                                                                               | 13                                                                                | 43                                                                                | 780                                                                               | 0                                                                                 | 0                                                                                   | 27                                                                                  | 2                                                                                   | 0                                                                                   | 107                                                                                 | 488                                                                                 |
| Heavy Vehicles (%)                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 3%                                                                                | 1%                                                                                | 0%                                                                                | 7%                                                                                  | 0%                                                                                  | 6%                                                                                  | 3%                                                                                  | 0%                                                                                  | 2%                                                                                  |
| Turn Type                         | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Split                                                                               | NA                                                                                  | Perm                                                                                | Split                                                                               | NA                                                                                  | pm+ov                                                                               |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                   | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   | 5                                                                                   |
| Permitted Phases                  | 2                                                                                 |                                                                                   | 2                                                                                 | 6                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |
| Actuated Green, G (s)             | 83.2                                                                              | 70.1                                                                              | 70.1                                                                              | 50.2                                                                              | 44.9                                                                              |                                                                                   |                                                                                     | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 10.7                                                                                | 41.2                                                                                |
| Effective Green, g (s)            | 83.2                                                                              | 70.1                                                                              | 70.1                                                                              | 50.2                                                                              | 44.9                                                                              |                                                                                   |                                                                                     | 6.4                                                                                 | 6.4                                                                                 |                                                                                     | 10.7                                                                                | 41.2                                                                                |
| Actuated g/C Ratio                | 0.69                                                                              | 0.58                                                                              | 0.58                                                                              | 0.42                                                                              | 0.37                                                                              |                                                                                   |                                                                                     | 0.05                                                                                | 0.05                                                                                |                                                                                     | 0.09                                                                                | 0.34                                                                                |
| Clearance Time (s)                | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               | 7.8                                                                               |                                                                                   |                                                                                     | 6.5                                                                                 | 6.5                                                                                 |                                                                                     | 5.4                                                                                 | 7.8                                                                                 |
| Vehicle Extension (s)             | 2.0                                                                               | 4.0                                                                               | 4.0                                                                               | 2.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                     | 1.5                                                                                 | 1.5                                                                                 |                                                                                     | 1.5                                                                                 | 2.0                                                                                 |
| Lane Grp Cap (vph)                | 506                                                                               | 1098                                                                              | 943                                                                               | 356                                                                               | 690                                                                               |                                                                                   |                                                                                     | 93                                                                                  | 81                                                                                  |                                                                                     | 158                                                                                 | 543                                                                                 |
| v/s Ratio Prot                    | c0.25                                                                             | 0.36                                                                              |                                                                                   | 0.01                                                                              | c0.42                                                                             |                                                                                   |                                                                                     | c0.02                                                                               |                                                                                     |                                                                                     | 0.06                                                                                | c0.23                                                                               |
| v/s Ratio Perm                    | 0.43                                                                              |                                                                                   | 0.01                                                                              | 0.05                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     | 0.08                                                                                |
| v/c Ratio                         | 0.98                                                                              | 0.62                                                                              | 0.01                                                                              | 0.12                                                                              | 1.13                                                                              |                                                                                   |                                                                                     | 0.29                                                                                | 0.02                                                                                |                                                                                     | 0.68                                                                                | 0.90                                                                                |
| Uniform Delay, d1                 | 37.7                                                                              | 16.3                                                                              | 10.5                                                                              | 20.8                                                                              | 37.5                                                                              |                                                                                   |                                                                                     | 54.6                                                                                | 53.8                                                                                |                                                                                     | 53.0                                                                                | 37.4                                                                                |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |
| Incremental Delay, d2             | 33.9                                                                              | 2.7                                                                               | 0.0                                                                               | 0.1                                                                               | 76.1                                                                              |                                                                                   |                                                                                     | 0.6                                                                                 | 0.0                                                                                 |                                                                                     | 8.7                                                                                 | 17.1                                                                                |
| Delay (s)                         | 71.6                                                                              | 19.0                                                                              | 10.5                                                                              | 20.9                                                                              | 113.7                                                                             |                                                                                   |                                                                                     | 55.2                                                                                | 53.9                                                                                |                                                                                     | 61.7                                                                                | 54.5                                                                                |
| Level of Service                  | E                                                                                 | B                                                                                 | B                                                                                 | C                                                                                 | F                                                                                 |                                                                                   |                                                                                     | E                                                                                   | D                                                                                   |                                                                                     | E                                                                                   | D                                                                                   |
| Approach Delay (s)                |                                                                                   | 40.5                                                                              |                                                                                   |                                                                                   | 108.9                                                                             |                                                                                   |                                                                                     | 54.5                                                                                |                                                                                     |                                                                                     | 55.6                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 64.7                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 1.00                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 102.6%                                                                            |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | G                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 0                                                                                 | 36                                                                                | 22                                                                                | 96                                                                                | 57                                                                                | 0                                                                                 | 30                                                                                  | 0                                                                                   | 544                                                                                 | 9                                                                                   | 606                                                                                 | 15                                                                                  |
| Future Volume (Veh/h)             | 0                                                                                 | 36                                                                                | 22                                                                                | 96                                                                                | 57                                                                                | 0                                                                                 | 30                                                                                  | 0                                                                                   | 544                                                                                 | 9                                                                                   | 606                                                                                 | 15                                                                                  |
| Sign Control                      |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                     | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                | 0.94                                                                                |
| Hourly flow rate (vph)            | 0                                                                                 | 38                                                                                | 23                                                                                | 102                                                                               | 61                                                                                | 0                                                                                 | 32                                                                                  | 0                                                                                   | 579                                                                                 | 10                                                                                  | 645                                                                                 | 16                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              | 283                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             | 0.83                                                                              | 0.83                                                                              |                                                                                   | 0.83                                                                              | 0.83                                                                              | 0.83                                                                              |                                                                                     |                                                                                     |                                                                                     | 0.83                                                                                |                                                                                     |                                                                                     |
| vC, conflicting volume            | 1057                                                                              | 1316                                                                              | 653                                                                               | 1068                                                                              | 1034                                                                              | 290                                                                               | 661                                                                                 |                                                                                     |                                                                                     | 579                                                                                 |                                                                                     |                                                                                     |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 969                                                                               | 1280                                                                              | 653                                                                               | 983                                                                               | 942                                                                               | 50                                                                                | 661                                                                                 |                                                                                     |                                                                                     | 397                                                                                 |                                                                                     |                                                                                     |
| tC, single (s)                    | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 4.1                                                                                 |                                                                                     |                                                                                     | 4.1                                                                                 |                                                                                     |                                                                                     |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 2.2                                                                                 |                                                                                     |                                                                                     | 2.2                                                                                 |                                                                                     |                                                                                     |
| p0 queue free %                   | 100                                                                               | 72                                                                                | 95                                                                                | 25                                                                                | 71                                                                                | 100                                                                               | 97                                                                                  |                                                                                     |                                                                                     | 99                                                                                  |                                                                                     |                                                                                     |
| cM capacity (veh/h)               | 147                                                                               | 134                                                                               | 462                                                                               | 136                                                                               | 211                                                                               | 855                                                                               | 937                                                                                 |                                                                                     |                                                                                     | 979                                                                                 |                                                                                     |                                                                                     |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 61                                                                                | 163                                                                               | 611                                                                               | 671                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                 | 102                                                                               | 32                                                                                | 10                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 23                                                                                | 0                                                                                 | 579                                                                               | 16                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 182                                                                               | 157                                                                               | 937                                                                               | 979                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.33                                                                              | 1.04                                                                              | 0.03                                                                              | 0.01                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 35                                                                                | 205                                                                               | 3                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 34.3                                                                              | 139.6                                                                             | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | D                                                                                 | F                                                                                 | A                                                                                 | A                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 34.3                                                                              | 139.6                                                                             | 0.9                                                                               | 0.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      | D                                                                                 | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 17.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 75.3%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

01/21/2022

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |  |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (veh/h)            | 36                                                                                | 592                                                                               | 1                                                                                 | 0                                                                                 | 152                                                                               | 22                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 217                                                                                 | 0                                                                                   | 15                                                                                  |
| Future Volume (Veh/h)             | 36                                                                                | 592                                                                               | 1                                                                                 | 0                                                                                 | 152                                                                               | 22                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 217                                                                                 | 0                                                                                   | 15                                                                                  |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     |
| Peak Hour Factor                  | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                |
| Hourly flow rate (vph)            | 38                                                                                | 617                                                                               | 1                                                                                 | 0                                                                                 | 158                                                                               | 23                                                                                | 1                                                                                   | 0                                                                                   | 7                                                                                   | 226                                                                                 | 0                                                                                   | 16                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 181                                                                               |                                                                                   |                                                                                   | 618                                                                               |                                                                                   |                                                                                   | 870                                                                                 | 874                                                                                 | 617                                                                                 | 870                                                                                 | 864                                                                                 | 170                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 181                                                                               |                                                                                   |                                                                                   | 618                                                                               |                                                                                   |                                                                                   | 870                                                                                 | 874                                                                                 | 617                                                                                 | 870                                                                                 | 864                                                                                 | 170                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 97                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 99                                                                                  | 14                                                                                  | 100                                                                                 | 98                                                                                  |
| cM capacity (veh/h)               | 1407                                                                              |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 263                                                                                 | 282                                                                                 | 494                                                                                 | 264                                                                                 | 286                                                                                 | 880                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | EB 2                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 655                                                                               | 1                                                                                 | 181                                                                               | 8                                                                                 | 242                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 38                                                                                | 0                                                                                 | 0                                                                                 | 1                                                                                 | 226                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 1                                                                                 | 23                                                                                | 7                                                                                 | 16                                                                                |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1407                                                                              | 1700                                                                              | 972                                                                               | 445                                                                               | 282                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.03                                                                              | 0.00                                                                              | 0.00                                                                              | 0.02                                                                              | 0.86                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 2                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 183                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 0.7                                                                               | 0.0                                                                               | 0.0                                                                               | 13.2                                                                              | 62.1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | B                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 0.7                                                                               |                                                                                   | 0.0                                                                               | 13.2                                                                              | 62.1                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | B                                                                                 | F                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     | 14.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization | 71.2%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

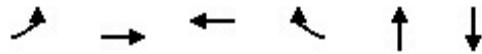
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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (veh/h)            | 477                                                                               | 293                                                                               | 0                                                                                 | 0                                                                                 | 169                                                                               | 271                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Future Volume (Veh/h)             | 477                                                                               | 293                                                                               | 0                                                                                 | 0                                                                                 | 169                                                                               | 271                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.92                                                                                | 0.93                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 513                                                                               | 315                                                                               | 0                                                                                 | 0                                                                                 | 182                                                                               | 291                                                                               | 0                                                                                   | 1                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (ft)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (ft/s)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (ft)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 473                                                                               |                                                                                   |                                                                                   | 315                                                                               |                                                                                   |                                                                                   | 1523                                                                                | 1814                                                                                | 315                                                                                 | 1524                                                                                | 1523                                                                                | 182                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 473                                                                               |                                                                                   |                                                                                   | 315                                                                               |                                                                                   |                                                                                   | 1523                                                                                | 1814                                                                                | 315                                                                                 | 1524                                                                                | 1523                                                                                | 182                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 53                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 98                                                                                  | 100                                                                                 | 100                                                                                 | 100                                                                                 | 100                                                                                 |
| cM capacity (veh/h)               | 1089                                                                              |                                                                                   |                                                                                   | 1257                                                                              |                                                                                   |                                                                                   | 61                                                                                  | 42                                                                                  | 725                                                                                 | 60                                                                                  | 62                                                                                  | 861                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | WB 2                                                                              | NB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 828                                                                               | 182                                                                               | 291                                                                               | 1                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 513                                                                               | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 0                                                                                 | 0                                                                                 | 291                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1089                                                                              | 1257                                                                              | 1700                                                                              | 42                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.47                                                                              | 0.00                                                                              | 0.17                                                                              | 0.02                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)            | 64                                                                                | 0                                                                                 | 0                                                                                 | 2                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 9.4                                                                               | 0.0                                                                               | 0.0                                                                               | 93.1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 9.4                                                                               | 0.0                                                                               |                                                                                   | 93.1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 6.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 71.9%                                                                             |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

## Queues

### 5: Commerical Entrance/Old Ivy Road & Ivy Road

01/21/2022



| Lane Group              | EBL  | EBT  | WBT  | WBR  | NBT  | SBT  |
|-------------------------|------|------|------|------|------|------|
| Lane Group Flow (vph)   | 46   | 536  | 750  | 392  | 18   | 268  |
| v/c Ratio               | 0.22 | 0.52 | 0.72 | 0.37 | 0.07 | 0.63 |
| Control Delay           | 12.8 | 12.2 | 17.7 | 2.8  | 0.5  | 18.6 |
| Queue Delay             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| Total Delay             | 12.8 | 12.2 | 17.7 | 2.8  | 0.5  | 18.6 |
| Queue Length 50th (ft)  | 6    | 87   | 145  | 2    | 0    | 39   |
| Queue Length 95th (ft)  | 38   | 285  | #519 | 50   | 0    | 117  |
| Internal Link Dist (ft) |      | 1062 | 920  |      | 247  | 459  |
| Turn Bay Length (ft)    | 90   |      |      |      |      |      |
| Base Capacity (vph)     | 212  | 1026 | 1035 | 1049 | 674  | 672  |
| Starvation Cap Reductn  | 0    | 0    | 0    | 0    | 0    | 0    |
| Spillback Cap Reductn   | 0    | 0    | 0    | 0    | 0    | 0    |
| Storage Cap Reductn     | 0    | 0    | 0    | 0    | 0    | 0    |
| Reduced v/c Ratio       | 0.22 | 0.52 | 0.72 | 0.37 | 0.03 | 0.40 |

#### Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 5: Commerical Entrance/Old Ivy Road & Ivy Road

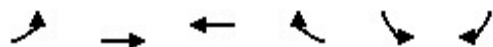
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|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |                                                                                   |                                                                                   |  |  |                                                                                     |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)              | 42                                                                                | 493                                                                               | 0                                                                                 | 0                                                                                 | 690                                                                               | 361                                                                               | 14                                                                                  | 0                                                                                   | 3                                                                                   | 191                                                                                 | 0                                                                                   | 55                                                                                  |
| Future Volume (vph)               | 42                                                                                | 493                                                                               | 0                                                                                 | 0                                                                                 | 690                                                                               | 361                                                                               | 14                                                                                  | 0                                                                                   | 3                                                                                   | 191                                                                                 | 0                                                                                   | 55                                                                                  |
| Ideal Flow (vphpl)                | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Total Lost time (s)               | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 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                                                                              |                                                                                     | 0.98                                                                                |                                                                                     |                                                                                     | 0.97                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1805                                                                              | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1783                                                                                |                                                                                     |                                                                                     | 1774                                                                                |                                                                                     |
| Flt Permitted                     | 0.20                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 0.96                                                                                |                                                                                     |                                                                                     | 0.96                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 386                                                                               | 1863                                                                              |                                                                                   |                                                                                   | 1881                                                                              | 1599                                                                              |                                                                                     | 1783                                                                                |                                                                                     |                                                                                     | 1774                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Adj. Flow (vph)                   | 46                                                                                | 536                                                                               | 0                                                                                 | 0                                                                                 | 750                                                                               | 392                                                                               | 15                                                                                  | 0                                                                                   | 3                                                                                   | 208                                                                                 | 0                                                                                   | 60                                                                                  |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 186                                                                               | 0                                                                                   | 18                                                                                  | 0                                                                                   | 0                                                                                   | 107                                                                                 | 0                                                                                   |
| Lane Group Flow (vph)             | 46                                                                                | 536                                                                               | 0                                                                                 | 0                                                                                 | 750                                                                               | 206                                                                               | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 161                                                                                 | 0                                                                                   |
| Heavy Vehicles (%)                | 0%                                                                                | 2%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   | NA                                                                                | Perm                                                                              | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     |
| Protected Phases                  |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 4                                                                                   | 4                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     |
| Permitted Phases                  | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 30.5                                                                              | 30.5                                                                              |                                                                                   |                                                                                   | 30.5                                                                              | 30.5                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |
| Effective Green, g (s)            | 30.5                                                                              | 30.5                                                                              |                                                                                   |                                                                                   | 30.5                                                                              | 30.5                                                                              |                                                                                     | 0.7                                                                                 |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.51                                                                              | 0.51                                                                              |                                                                                   |                                                                                   | 0.51                                                                              | 0.51                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.17                                                                                |                                                                                     |
| Clearance Time (s)                | 7.0                                                                               | 7.0                                                                               |                                                                                   |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                     | 6.0                                                                                 |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                     | 2.0                                                                                 |                                                                                     |                                                                                     | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 195                                                                               | 943                                                                               |                                                                                   |                                                                                   | 952                                                                               | 810                                                                               |                                                                                     | 20                                                                                  |                                                                                     |                                                                                     | 294                                                                                 |                                                                                     |
| v/s Ratio Prot                    |                                                                                   | 0.29                                                                              |                                                                                   |                                                                                   | c0.40                                                                             |                                                                                   |                                                                                     | c0.00                                                                               |                                                                                     |                                                                                     | c0.09                                                                               |                                                                                     |
| v/s Ratio Perm                    | 0.12                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 0.13                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.24                                                                              | 0.57                                                                              |                                                                                   |                                                                                   | 0.79                                                                              | 0.25                                                                              |                                                                                     | 0.01                                                                                |                                                                                     |                                                                                     | 0.55                                                                                |                                                                                     |
| Uniform Delay, d1                 | 8.3                                                                               | 10.3                                                                              |                                                                                   |                                                                                   | 12.2                                                                              | 8.4                                                                               |                                                                                     | 29.4                                                                                |                                                                                     |                                                                                     | 23.0                                                                                |                                                                                     |
| Progression Factor                | 1.00                                                                              | 1.00                                                                              |                                                                                   |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                     | 1.00                                                                                |                                                                                     |                                                                                     | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.9                                                                               | 1.0                                                                               |                                                                                   |                                                                                   | 4.6                                                                               | 0.2                                                                               |                                                                                     | 0.1                                                                                 |                                                                                     |                                                                                     | 2.1                                                                                 |                                                                                     |
| Delay (s)                         | 9.2                                                                               | 11.2                                                                              |                                                                                   |                                                                                   | 16.8                                                                              | 8.6                                                                               |                                                                                     | 29.5                                                                                |                                                                                     |                                                                                     | 25.1                                                                                |                                                                                     |
| Level of Service                  | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 | A                                                                                 |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 11.1                                                                              |                                                                                   |                                                                                   | 14.0                                                                              |                                                                                   |                                                                                     | 29.5                                                                                |                                                                                     |                                                                                     | 25.1                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 14.8                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                           |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 60.2                                                                              |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 63.2%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                                |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# HCM Unsignalized Intersection Capacity Analysis

## 19: Old Ivy Road & Site Entrance

01/21/2022



| Movement                          | EBL  | EBT  | WBT   | WBR  | SBL                  | SBR  |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations               |      |      |       |      |                      |      |
| Traffic Volume (veh/h)            | 132  | 161  | 315   | 88   | 52                   | 77   |
| Future Volume (Veh/h)             | 132  | 161  | 315   | 88   | 52                   | 77   |
| Sign Control                      |      | Free | Free  |      | Stop                 |      |
| Grade                             |      | 0%   | 0%    |      | 0%                   |      |
| Peak Hour Factor                  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92                 | 0.92 |
| Hourly flow rate (vph)            | 143  | 175  | 342   | 96   | 57                   | 84   |
| 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            | 438  |      |       |      | 803                  | 342  |
| vC1, stage 1 conf vol             |      |      |       |      |                      |      |
| vC2, stage 2 conf vol             |      |      |       |      |                      |      |
| vCu, unblocked vol                | 438  |      |       |      | 803                  | 342  |
| tC, single (s)                    | 4.1  |      |       |      | 6.4                  | 6.2  |
| tC, 2 stage (s)                   |      |      |       |      |                      |      |
| tF (s)                            | 2.2  |      |       |      | 3.5                  | 3.3  |
| p0 queue free %                   | 87   |      |       |      | 81                   | 88   |
| cM capacity (veh/h)               | 1122 |      |       |      | 308                  | 701  |
| Direction, Lane #                 | EB 1 | EB 2 | WB 1  | WB 2 | SB 1                 |      |
| Volume Total                      | 143  | 175  | 342   | 96   | 141                  |      |
| Volume Left                       | 143  | 0    | 0     | 0    | 57                   |      |
| Volume Right                      | 0    | 0    | 0     | 96   | 84                   |      |
| cSH                               | 1122 | 1700 | 1700  | 1700 | 462                  |      |
| Volume to Capacity                | 0.13 | 0.10 | 0.20  | 0.06 | 0.31                 |      |
| Queue Length 95th (ft)            | 11   | 0    | 0     | 0    | 32                   |      |
| Control Delay (s)                 | 8.7  | 0.0  | 0.0   | 0.0  | 16.2                 |      |
| Lane LOS                          | A    |      |       |      | C                    |      |
| Approach Delay (s)                | 3.9  |      | 0.0   |      | 16.2                 |      |
| Approach LOS                      |      |      |       |      | C                    |      |
| <b>Intersection Summary</b>       |      |      |       |      |                      |      |
| Average Delay                     |      |      | 3.9   |      |                      |      |
| Intersection Capacity Utilization |      |      | 41.5% |      | ICU Level of Service | A    |
| Analysis Period (min)             |      |      | 15    |      |                      |      |

Queuing and Blocking Report  
2025 Total Future PM Peak

01/21/2022

Intersection: 1: Canterbury Road /Route 846 & Ivy Road

| Movement              | EB  | EB  | EB  | WB  | WB  | NB  | NB  | SB  | SB |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Directions Served     | L   | T   | R   | L   | TR  | LT  | R   | LT  | R  |
| Maximum Queue (ft)    | 621 | 504 | 29  | 200 | 624 | 72  | 55  | 212 | 76 |
| Average Queue (ft)    | 330 | 171 | 5   | 69  | 588 | 22  | 16  | 200 | 73 |
| 95th Queue (ft)       | 578 | 366 | 22  | 206 | 689 | 57  | 41  | 224 | 86 |
| Link Distance (ft)    | 882 | 882 |     |     | 586 | 575 |     | 201 |    |
| Upstream Blk Time (%) | 0   | 0   |     |     | 59  |     |     | 27  |    |
| Queuing Penalty (veh) | 0   | 0   |     |     | 0   |     |     | 196 |    |
| Storage Bay Dist (ft) |     |     | 450 | 200 |     |     | 180 |     | 75 |
| Storage Blk Time (%)  |     | 0   |     | 0   | 60  |     |     | 32  | 29 |
| Queuing Penalty (veh) |     | 0   |     | 1   | 24  |     |     | 191 | 29 |

Intersection: 2: Route 846/Route 29 Off-Ramp & Old Garth Road/Old Ivy Road

| Movement              | EB  | WB  | NB  | SB   |
|-----------------------|-----|-----|-----|------|
| Directions Served     | TR  | LT  | LTR | LTR  |
| Maximum Queue (ft)    | 85  | 184 | 84  | 1150 |
| Average Queue (ft)    | 33  | 76  | 25  | 1116 |
| 95th Queue (ft)       | 66  | 151 | 66  | 1210 |
| Link Distance (ft)    | 394 | 299 | 201 | 1106 |
| Upstream Blk Time (%) |     | 0   |     | 98   |
| Queuing Penalty (veh) |     | 0   |     | 0    |
| Storage Bay Dist (ft) |     |     |     |      |
| Storage Blk Time (%)  |     |     |     |      |
| Queuing Penalty (veh) |     |     |     |      |

Intersection: 3: Commercial Entrance/Faulconer Driver & Old Ivy Road

| Movement              | EB  | WB  | NB  | SB  | SB  |
|-----------------------|-----|-----|-----|-----|-----|
| Directions Served     | LT  | LTR | LTR | LT  | R   |
| Maximum Queue (ft)    | 90  | 5   | 30  | 218 | 76  |
| Average Queue (ft)    | 10  | 0   | 6   | 97  | 16  |
| 95th Queue (ft)       | 51  | 5   | 24  | 182 | 53  |
| Link Distance (ft)    | 299 | 332 | 171 | 352 |     |
| Upstream Blk Time (%) |     |     |     |     |     |
| Queuing Penalty (veh) |     |     |     |     |     |
| Storage Bay Dist (ft) |     |     |     |     | 190 |
| Storage Blk Time (%)  | 0   |     |     | 2   | 0   |
| Queuing Penalty (veh) | 0   |     |     | 0   | 0   |

Queuing and Blocking Report  
2025 Total Future PM Peak

01/21/2022

Intersection: 4: Commercial Entrance/Route 29 On-Ramp & Old Ivy Road

| Movement              | EB  | WB  | NB  |
|-----------------------|-----|-----|-----|
| Directions Served     | LTR | R   | LTR |
| Maximum Queue (ft)    | 324 | 47  | 16  |
| Average Queue (ft)    | 148 | 12  | 1   |
| 95th Queue (ft)       | 273 | 33  | 10  |
| Link Distance (ft)    | 332 |     | 194 |
| Upstream Blk Time (%) | 0   |     |     |
| Queuing Penalty (veh) | 2   |     |     |
| Storage Bay Dist (ft) |     | 250 |     |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

Intersection: 5: Commerical Entrance/Old Ivy Road & Ivy Road

| Movement              | EB | EB   | WB  | WB  | NB  | SB  |
|-----------------------|----|------|-----|-----|-----|-----|
| Directions Served     | L  | T    | T   | R   | LTR | LTR |
| Maximum Queue (ft)    | 86 | 244  | 352 | 116 | 43  | 194 |
| Average Queue (ft)    | 21 | 67   | 166 | 55  | 13  | 99  |
| 95th Queue (ft)       | 68 | 169  | 285 | 93  | 37  | 164 |
| Link Distance (ft)    |    | 1037 | 956 | 956 | 277 | 420 |
| Upstream Blk Time (%) |    |      |     |     |     |     |
| Queuing Penalty (veh) |    |      |     |     |     |     |
| Storage Bay Dist (ft) | 90 |      |     |     |     |     |
| Storage Blk Time (%)  | 4  | 3    |     |     |     |     |
| Queuing Penalty (veh) | 18 | 1    |     |     |     |     |

Intersection: 19: Old Ivy Road & Site Entrance

| Movement              | EB  | WB  | SB  |
|-----------------------|-----|-----|-----|
| Directions Served     | L   | R   | LR  |
| Maximum Queue (ft)    | 70  | 12  | 96  |
| Average Queue (ft)    | 29  | 1   | 43  |
| 95th Queue (ft)       | 61  | 7   | 74  |
| Link Distance (ft)    |     |     | 592 |
| Upstream Blk Time (%) |     |     |     |
| Queuing Penalty (veh) |     |     |     |
| Storage Bay Dist (ft) | 150 | 150 |     |
| Storage Blk Time (%)  |     |     |     |
| Queuing Penalty (veh) |     |     |     |

Network Summary

Network wide Queuing Penalty: 464