

Sycolin Road Phase IV Widening Project

State Proj. #U000-253-312, UPC# 102895

Traffic Operational Analysis



Aerial Provided by Google Earth

Prepared For:
Virginia Department of Transportation
At the Request of:
Town of Leesburg

September 2015



Rinker Design Associates, P.C.
9385 Discovery Blvd., Suite 200, Manassas, Virginia, 20109

Traffic Operational Analysis

Sycolin Road Widening Phase IV

State Project# U000-253-312
UPC# 102895

For the following Intersections:

VDOT Maintained:

Sycolin Road (Route 643) at Claudia Drive
Sycolin Road (Route 643) at Loudoun Center Place

Town of Leesburg Maintained:

Sycolin Road (Route 643) at Leesburg Airport Entrance
Sycolin Road (Route 643) at Miller Drive SE
Sycolin Road (Route 643) at Tavistock Drive SE
Sycolin Road (Route 643) at Utility Facility Entrance
Sycolin Road (Route 643) at Tolbert Lane SE (Route 654)

Prepared by:

Rinker Design Associates, P.C.

Prepared for:

Virginia Department of Transportation

At the Request of:

Town of Leesburg

September 2015

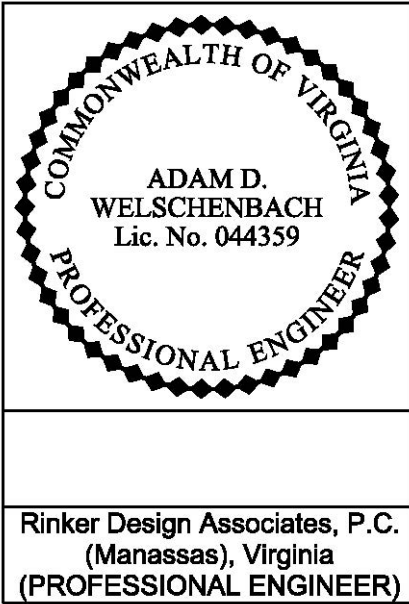


Table of Contents

	Page
EXECUTIVE SUMMARY	1
SECTION 1: INTRODUCTION	2
SECTION 2: BACKGROUND INFORMATION	4
SECTION 3: EXISTING CONDITIONS ANALYSIS	7
SECTION 4: ANALYSIS OF FORECASTED GROWTH & BACKGROUND DEVELOPMENT	10
SECTION 5: FORECASTED VOLUMES	11
SECTION 6: SUPPLEMENTAL REVIEWS	14
SECTION 7: CAPACITY ANALYSIS OF FUTURE CONDITIONS	15
SECTION 9: QUEUING ANALYSIS FOR TURNING MOVEMENTS	21
SECTION 10: PRINCIPAL FINDINGS	23

APPENDICES:

- Appendix A: Existing Intersection Counts**
- Appendix B: Scoping Meeting Documents**
- Appendix C: Level of Service Descriptions**
- Appendix D: Synchro™ Reports for Existing Year (2015)**
- Appendix E: Extracted Pages from Cornerstone Chapel (Church) Traffic Study**
- Appendix F: Correspondence from the Town of Leesburg**
- Appendix G: Synchro™ Report for Opening Year (2019)**
- Appendix H: Synchro™ Report for Horizon Year (2039)**
- Appendix I: Intentionally Skipped**
- Appendix J: Synchro™ Sim-Traffic Reports**

EXECUTIVE SUMMARY

Purpose

This report presents the results of an intersection operational analysis conducted for Sycolin Road (Route 643) between Sycolin Road /Tolbert Lane (in the Town of Leesburg) and Sycolin Road/Claudia Drive (Loudoun County). The purpose of this operational report is to assess how well the improvements related to the Town's Sycolin Road Phase IV Widening project accommodate the forecasted demand.

Study Area

The study area for this Traffic Operational Analysis as reviewed and agreed to with VDOT NOVA Traffic Engineering and Town of Leesburg staff, was selected and based on those intersections that will be indirectly and directly affected by the Sycolin Road Phase IV Widening project. The study area was derived to allow a comparison between the existing traffic generated and anticipated traffic growth. The analysis is limited to the following intersections which were selected for detailed analysis:

1. Sycolin Road (Route 643) at Loudoun Center Place
2. Sycolin Road (Route 643) at Leesburg Airport Entrance
3. Sycolin Road (Route 643) at Miller Drive SE
4. Sycolin Road (Route 643) at Tavistock Drive SE
5. Sycolin Road (Route 643) at Utility Facility Entrance

Overall Conclusions and Recommendations:

The Town of Leesburg's Sycolin Road Phase IV Widening project is the final construction phase of a multiple phase project to improve Sycolin Road (Route 643) between the Town of Leesburg's southern corporate limits and the Leesburg Bypass (Route 7 / Route 15). The primary purposes of the project are as follows:

- Provide adequate roadway capacity and reduce congestion
- Improve substandard conditions along Sycolin Road (Route 643) to meet current design criteria
- Provide facilities to accommodate pedestrians and bicyclists via shared use paths, etc.

The Town's Sycolin Road Phase IV Widening project will provide for adequate roadway capacity and a reduction in congestion for future years. This is demonstrated in a comparison of the traffic volumes and travel conditions (delay) that are expected to be experienced by vehicular traffic in a No-Build Option versus the Build-Option. This accomplishes one of the primary purposes outlined by the Town for this project.

Section 1

INTRODUCTION

STUDY SCOPE

Purpose

This report presents the results of an intersection operational analysis conducted for Sycolin Road (Route 643) between Sycolin Road /Tolbert Lane (in the Town of Leesburg) and Sycolin Road/Claudia Drive (Loudoun County).

The purpose of this operational report is to assess how well the improvements related to the Town's Sycolin Road Phase IV Widening project accommodate the forecasted demand.

Analysis Objectives/Methodology

The objective of this analysis is to evaluate existing traffic conditions in the study area, traffic conditions in the study area during the Opening Year (2019), and traffic conditions twenty years after construction in the Horizon Year (2039). Additionally this analysis will provide discussions on projected growth, discussions on planned improvements, and conclusions.

This signal warrant and operational analyses were conducted in accordance with methodologies defined in the 2000 Highway Capacity Manual (HCM), FHWA Publication No. HRT-01-091, Signalized Intersections: Informational Guide, and the FHWA's MUTCD.

Tasks within the scope of this analysis include the following:

1. Review of the plans and timeline for construction of the Town of Leesburg's Sycolin Road Phase IV Widening project (State Project #U000-253-312);
2. A review of the existing volumes and the anticipated volumes;
3. A field visit of the site to gather information pertaining to intersection geometry, traffic controls, and speed limit, and to determine existing trip distributions;
4. Field collection of turning counts at study intersections coordinated with VDOT and the Town of Leesburg;
5. Development of traffic growth rates for traffic projections;
6. Analysis of existing levels of service at the study intersections;
7. Forecast of design hourly traffic volumes for the Opening Year (2019) and Horizon Year (2039) using growth rates for weekday AM and PM peak periods;
8. Analysis of signalized intersections using Synchro™ Version 8.0;
9. At the request of VDOT, an analysis of queue lengths for the turn lanes for intersections directly impacted by the site improvements.

This report has been generated to be reviewed by VDOT and fulfill the requirements for Traffic Operational Analyses typically requested by VDOT.

Study Area

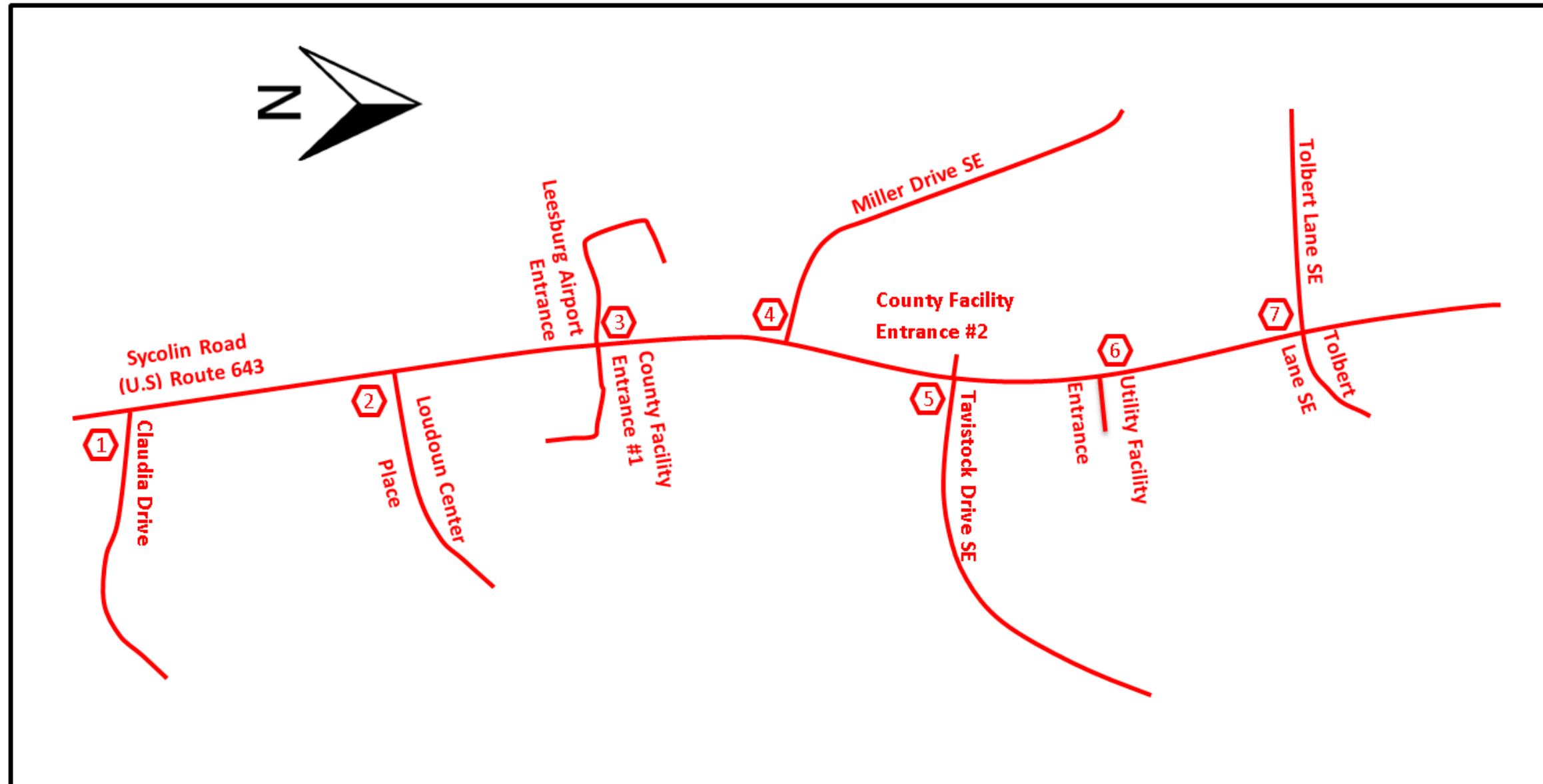
The study area for this Traffic Operational Analysis as reviewed and agreed to with VDOT NOVA Traffic Engineering and Town of Leesburg staff, was selected and based on those intersections that will be indirectly and directly affected by the Sycolin Road Phase IV Widening project. The study area was derived to allow a comparison between the existing traffic generated and anticipated traffic growth. The analysis is limited to the following intersections which were selected for detailed analysis:

1. Sycolin Road (Route 643) at Loudoun Center Place
2. Sycolin Road (Route 643) at Leesburg Airport Entrance
3. Sycolin Road (Route 643) at Miller Drive SE
4. Sycolin Road (Route 643) at Tavistock Drive SE
5. Sycolin Road (Route 643) at Utility Facility Entrance

Appendix B shows coordination between RDA, VDOT, and the Town of Leesburg for the study scope.

Figure 1-1 shows the location of the study area.

Figure 1-1: Location of Study Area



1. Sycolin Road (Route 643) at Claudia Drive
2. Sycolin Road (Route 643) at Loudoun Center Place
3. Sycolin Road (Route 643) at Leesburg Airport Entrance
4. Sycolin Road (Route 643) at Miller Drive SE
5. Sycolin Road (Route 643) at Tavistock Drive SE
6. Sycolin Road (Route 643) at Utility Facility Entrance
7. Sycolin Road (Route 643) at Tolbert Lane SE

Section 2

Background Information

ROADWAY NETWORK

Existing Roadway

Sycolin Road (Route 643) is an urban major collector that runs north-south from the Town of Leesburg to Ashburn in Loudoun County. The segment of Sycolin Road (Route 643) within the study area (See **Figure 2-1**) at the northern limit is an existing four-lane divided highway and narrows to a two lane undivided highway following the first intersection within the project's study limits heading south. The posted speed is 35 MPH within the Town limits and posted 45 MPH south of the Town limits. The annual average daily traffic (AADT 2015) is 15,000 from the northern limits (of study area) to the intersection of Sycolin Road (Route 643) and Miller Drive, and 17,000 from the intersection of Sycolin Road (Route 643) and Miller Drive to the southern limits of the study area.

[Note: For the sake of consistency, it was requested by the Town to utilize State Route 643 for Sycolin Road, despite Sycolin Road within the project limits also having a State Route 625 designation.]

Study Intersections

Sycolin Road (Route 643) at Claudia Drive:

This is an unsignalized "T"-intersection in which Sycolin Road (Route 643) is the north-south movement and Claudia Drive approaches from the east. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. Claudia Drive primarily serves Philip A. Bolen Memorial Park which is a large regional park containing multiple soccer and baseball fields. Additionally, Claudia Drive serves as the primary access point for a large commuter park and ride lot utilized by commuters and buses.

Sycolin Road (Route 643) at Loudoun Center Place:

At the start of this project, this was an unsignalized "T"-intersection in which Sycolin Road (Route 643) is the north-south movement and Loudoun Center Place approaches from the east. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. Loudoun Center Place primarily serves as the primary access point for multiple Loudoun County agencies and State of Virginia agencies (e.g. State Police, Loudoun County Fire Department, Loudoun County Juvenile Detention Center, Loudoun County Public School Bus Depot, Loudoun County Magistrate, Loudoun County Youth Shelter, Loudoun County Transitional Housing and Adult Day Care, etc.).

During scoping of the traffic study with VDOT and Town of Leesburg, it was reported that VDOT has approved a signal design (completed by others) and construction has started for a signal to be installed at this intersection. The signal construction has been completed as of September 2015. This report assumes the signal is operational for the existing condition.

Sycolin Road (Route 643) at Leesburg Airport Entrance:

This is an unsignalized four-leg intersection in which Sycolin Road (Route 643) is the north-south movement, County Facility Entrance #1 approaches from the east, and Leesburg Airport Entrance approaches from the west. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. County Facility Entrance #1 services a warehouse depot for Loudoun County and Loudoun County Public School. The Leesburg Airport Entrance serves as the primary access to the Leesburg Airport.

Sycolin Road (Route 643) at Miller Drive SE:

This is an unsignalized "T"-intersection in which Sycolin Road (Route 643) is the north-south movement and Miller Drive SE approaches from the west. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. Miller Drive SE primarily serves local residential and business traffic and is also a connection to the Dulles Greenway/Toll Road (Route 267).

Sycolin Road (Route 643) at Tavistock Drive SE:

This is an existing signalized four-leg intersection in which Sycolin Road (Route 643) is the north-south movement, Tavistock Drive SE approaches from the east and County Facility Entrance #2 approaches from the west. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. Tavistock Drive SE primarily serves residential traffic, and County Facility Entrance #2 serves as an access point for several Loudoun County agencies (e.g. the Loudoun County Sheriff's Office, the Loudoun County 911 Call Center, etc.).

Sycolin Road (Route 643) at Utility Facility Entrance:

This is an unsignalized "T"-intersection in which Sycolin Road (Route 643) is the north-south movement and the Utility Facility Entrance approaches from the east. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. The Utility Facility Entrance serves Dominion Virginia Power.

Sycolin Road (Route 643) at Tolbert Lane SE:

This is an existing signalized four-leg intersection in which Sycolin Road (Route 643) is the north-south movement and Tolbert Lane SE is the east-west movement. Sycolin Road (Route 643) primarily serves local residential and business/airport traffic as well as regional commuter traffic. Tolbert Lane SE primarily serves local residential traffic from the west and serves as the primary entrance to a Church and one adjacent commercial property.

Please see **Figure 2-1** showing the existing conditions with lane configurations for the study intersections.

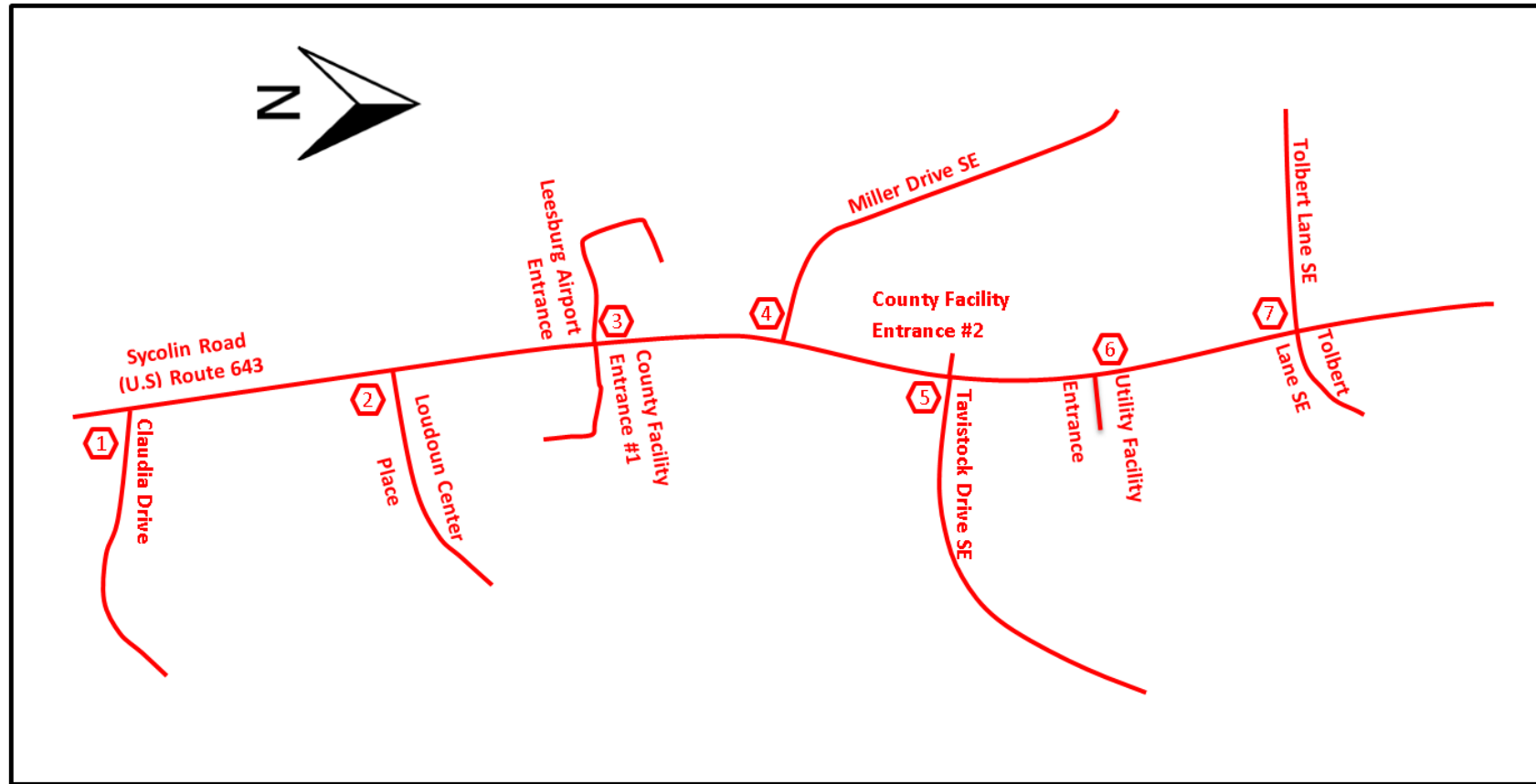
Planned Transportation Improvements

This is the final construction phase of a multiple phase project to improve Sycolin Road (Route 643) between the Town of Leesburg's southern corporate limits and the Leesburg Bypass (Route 7 / Route 15). The primary purposes of the project are as follows:

- Provide adequate roadway capacity and reduce congestion
- Improve substandard conditions along Sycolin Road (Route 643) to meet current design criteria
- Provide facilities to accommodate pedestrians and bicyclists via shared use paths, etc.

The project involves widening 3,500 LF (0.66 mile) of Sycolin Road from two lanes to a four-lane divided highway. The new typical section will include two 12-foot wide travel lanes in each direction divided by a raised median. The roadway will have standard curb and gutter, a ten-foot wide asphalt shared use path on the east side, and a five-foot wide sidewalk on the west side. Turn lanes are planned to be provided at the Tavistock Drive, Miller Drive, and Airport Entrance intersections. Please see **Figure 2-2** showing the planned transportation improvements to be made to the study intersections.

Figure 2-1: Existing Year (2015)
Existing Intersection Geometry



Existing Year (2015) Intersection Geometry

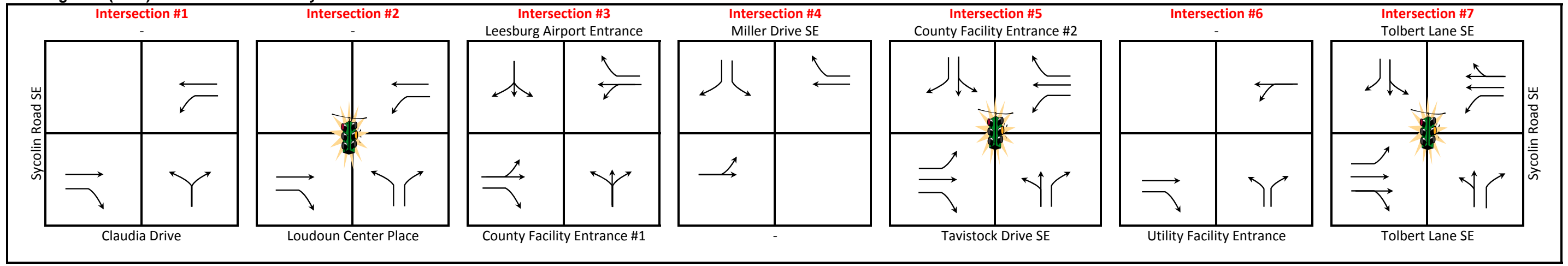
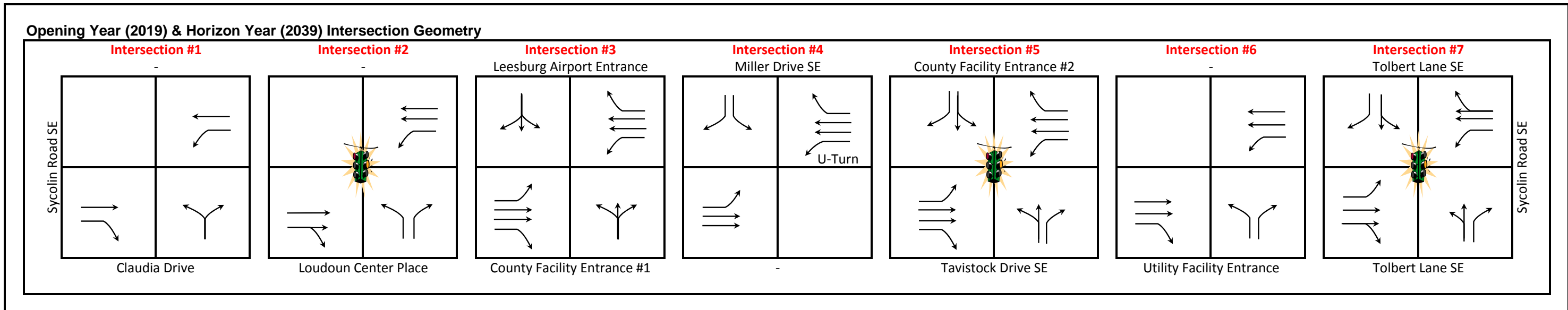
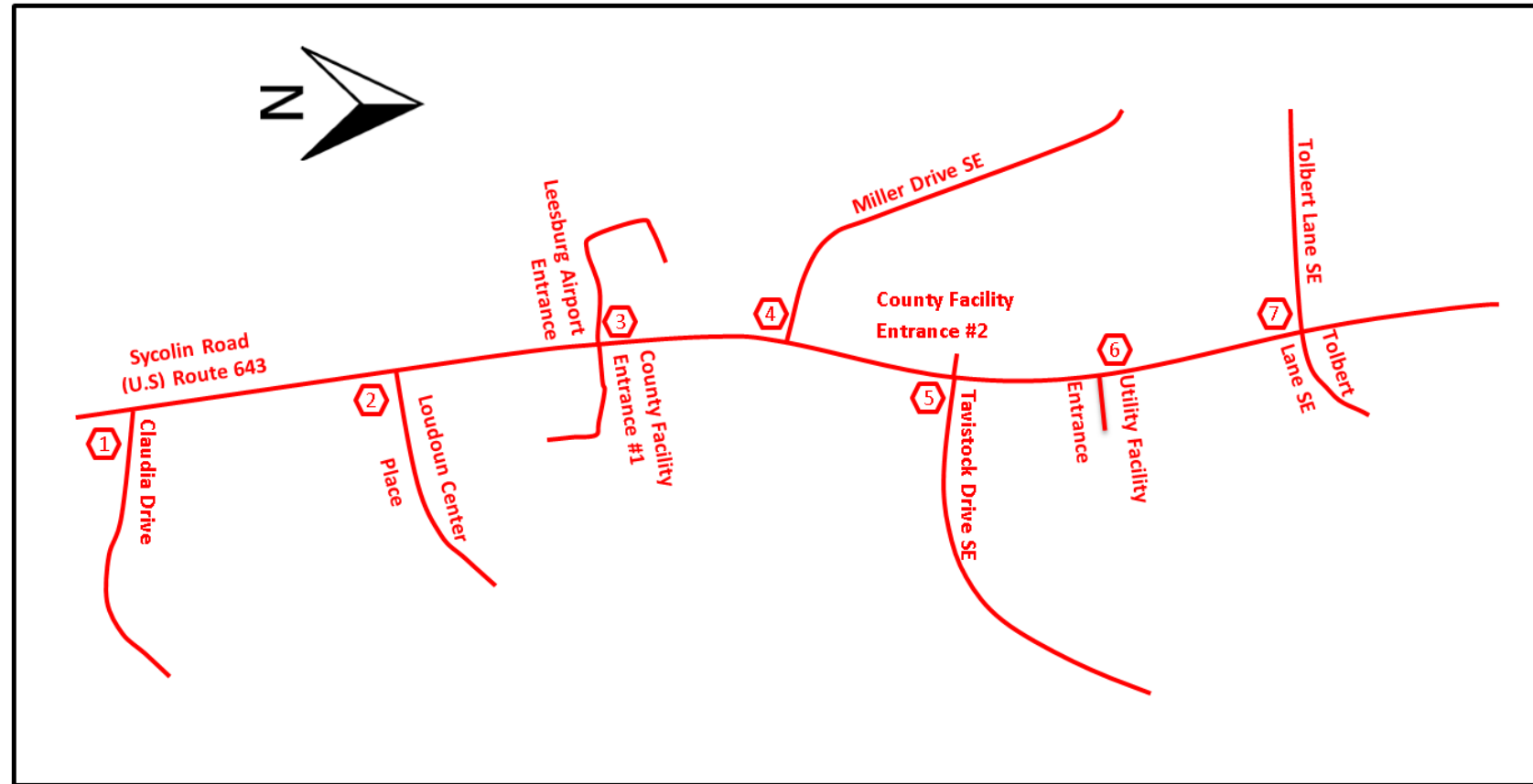


Figure 2-2: Opening Year (2019) & Horizon Year (2039)
Proposed Intersection Geometry



Section 3 EXISTING CONDITIONS ANALYSIS

Existing Year (2015)

Existing Traffic Volumes

Turning movement counts were conducted from Tuesday May 12th, 2015 from 6:00 AM to 9:00 AM for the morning and 4:00 PM to 7:00 PM for the following existing study intersections:

1. Sycolin Road (Route 643) at Claudia Drive*
2. Sycolin Road (Route 643) at Loudoun Center Place
3. Sycolin Road (Route 643) at Leesburg Airport Entrance
4. Sycolin Road (Route 643) at Miller Drive SE
5. Sycolin Road (Route 643) at Tavistock Drive SE
6. Sycolin Road (Route 643) at Utility Facility Entrance
7. Sycolin Road (Route 643) at Tolbert Lane SE*

[*Note: It was agreed at the traffic scoping meeting that these intersections did not require detailed analysis, but included to ensure volumes collected in and out of the study area could be balanced.]

From these turning movement counts, common peak hours along Sycolin Road (Route 643) were determined. The AM peak hour occurred from 6:45 AM to 7:45 AM, and the PM peak hour occurred from 4:45 PM to 5:45 PM.

Existing Year (2015) field collected counts are provided in **Appendix A**.

Existing Year (2015) balanced baseline turning movement counts for each existing intersection is provided in **Figure 3-1**. Intersection volumes were balanced within 10% per normal industry practice.

Capacity Analysis

Levels of service (LOS) analyses were conducted at each existing study intersections based on the existing lane use and traffic control shown in **Figure 2-1**, existing peak hour traffic volumes shown in **Figure 3-1**, and traffic signal timings obtained from VDOT and Town of Leesburg.

SynchroTM (Version 8.0) was used to conduct the analysis of each existing study intersection during the AM and PM peak periods. SynchroTM reports operating conditions for each movement at signalized intersections in terms of LOS. The levels of service reported for the signalized intersections were taken from the 2000 Highway Capacity Manual (HCM) reports (per discussions with VDOT – See **Appendix B**) generated by SynchroTM. Levels of service descriptions are included in **Appendix C**.

The SynchroTM reports are presented in **Appendix D**. The SynchroTM results are summarized and depicted in **Figure 3-2**.

As shown in **Figure 3-2**, it is observed that all of the existing study intersections do not operate at an overall acceptable level of service (i.e. LOS “D” or better for urban conditions) during AM or PM peak hours.

Although unsignalized intersection are not measured with an overall intersection level of service, a representative measure of the side-street level of service provides a good representation of the delays experienced by approaching vehicles attempting turning movements. As observed in **Figure 3-2**, most approaching side street level of service delays exceed acceptable norms for urban conditions (i.e. LOS “D” or better is acceptable for urban conditions).

Figure 3-1:

Existing Year (2015) Volumes

Baseline Existing Year (2015) [Balanced Intx.]

[Note: Arrows refer to lane groups, not number of lanes, see **Figure 2-1** in **Section 2** for existing lane configurations]

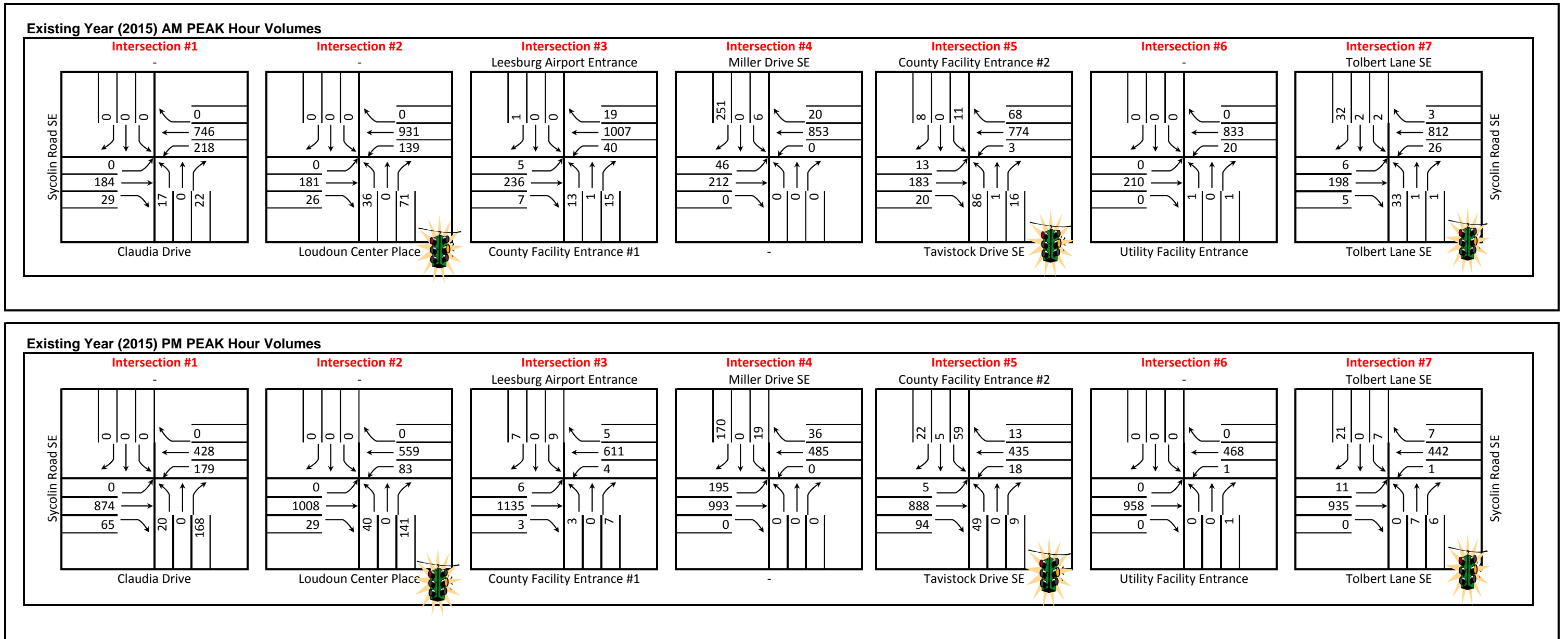
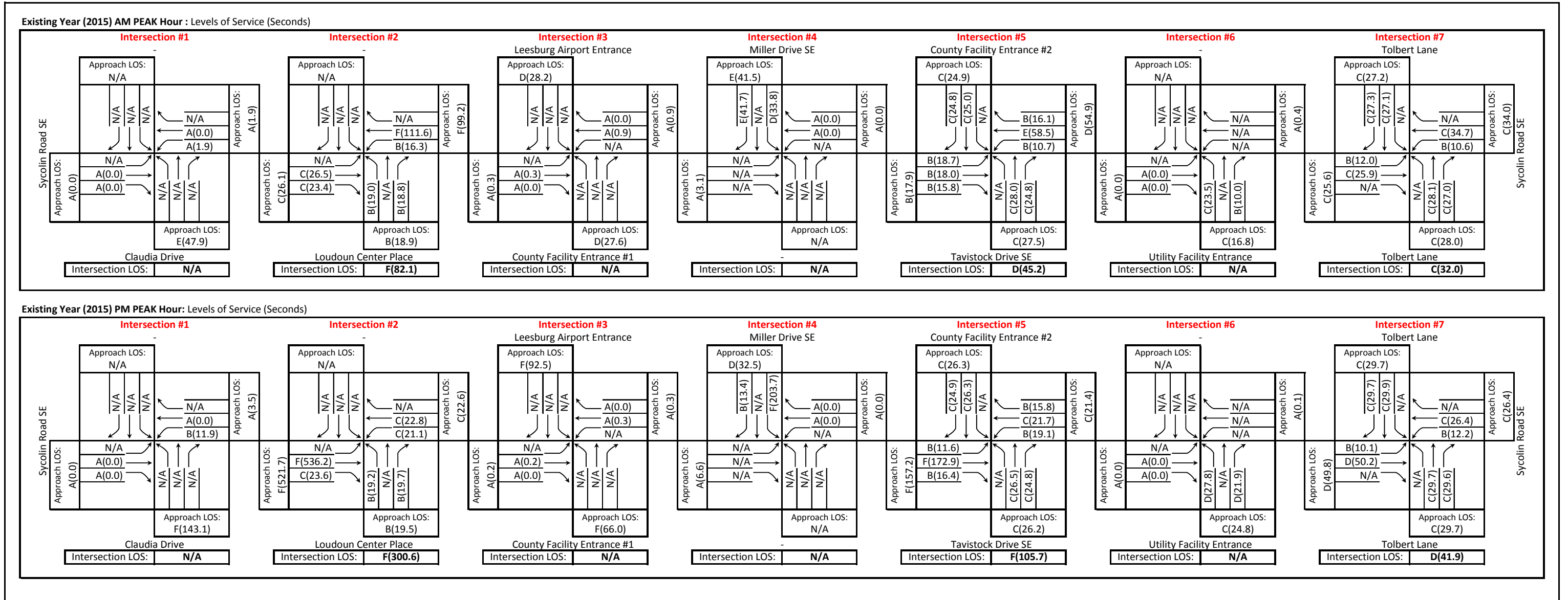


Figure 3-2: Existing Year (2015)

LOS Analysis Results

[Note: Arrows refer to lane groups, not number of lanes, see Figure 2-1 in Section 2 for existing lane configurations]



Section 4

ANALYSIS OF FORECASTED GROWTH & BACKGROUND ADJACENT SITE DEVELOPMENT

Regional Traffic Volume Growth

Per discussion with VDOT and Town of Leesburg during scoping of the traffic study, VDOT requested (with Town's concurrence) that a 2% annual growth in traffic volumes on Sycolin Road (Route 643) be utilized for the development of future traffic volumes to be analyzed.

See **Appendix B** for pre-coordinated scope reviewed and accepted by VDOT and Town of Leesburg.

Traffic Growth for Connecting Roadways/Entrances

Per discussion with the Town of Leesburg, the following traffic volume growth was implemented for the study based on available information for adjacent site development:

- Tolbert Lane (WB Approach), Miller Drive, Loudoun Center Place, and Claudia Drive: 2% per year growth, consistent with VDOT's request for 2% a year for regional growth for Sycolin Road
- Tavistock Drive (EB Approach): 1% per year growth. The existing residential community is fully built out.
- County Facility Entrance #1, County Facility Entrance #2 and Leesburg Airport Entrance: 0.5% per year growth.
 - Both County Facilities have maximized their sites and there are no known plans to redevelop the sites.
 - Leesburg Airport Entrance: Per the Town's long term planning, there are no known long term funded plans for any airport expansion or additional runways to be added. (This was confirmed per discussions with Town of Leesburg.)
- Utility Facility Entrance: No growth in traffic was assumed for this facility as it serves only one property owner, Dominion Virginia Power. No plans for redevelopment of the site are known.

Background Adjacent Site Development

In discussions with the Town, there was only one site within the project's study area that would alter growth and/or traffic patterns on Sycolin Road (Route 643). Below is a discussion of this site.

Cornerstone Chapel (Church) Site: This site is currently under construction at the northern end of the study area at the intersection of Sycolin Road (Route 643) and Tolbert Lane (WB Approach).

A traffic study, prepared by Wells + Associates Inc., for the site was obtained from the Town of Leesburg. This site is the future Cornerstone Chapel Church site, which is constructing a 1,000-seat sanctuary and a 200-student private day school. The study prepared by Wells + Associates Inc. provided a schedule that the site would be developed in two phases with full development by 2016.

Based on the schedule outlined on the Cornerstone Chapel website (summer 2015 update video), it would appear the site's schedule is a couple years behind but progressing in earnest. It was determined that the traffic volumes in/out of this site would remain the same regardless of the time frame with respect to the Sycolin Road (Route 643) widening project.

[Note: Cornerstone Chapel Traffic Study is available upon request from the Town of Leesburg. Only relevant Figures showing Total Peak Hour Volume Forecasts were extracted and are shown in **Appendix E.**]

In the interest of conservatism, the site's 2016 (full build-out) volumes as estimated by the Wells + Associates Inc. study were utilized for this project's Opening Year (2019) volumes and their 20-year projected volumes were included in this project's Horizon Year (2039) volumes. (See **Section 5** for volumes.)

Section 5

FORECASTED VOLUMES

For Opening Year (2019) & Horizon Year (2039)

Opening Year (2019) Traffic Forecast

For the Opening Year (2019), AM & PM peak hour traffic volumes were developed by taking the existing year balanced counts for each intersection and applying the appropriate average annual growth rate discussed in **Section 4** of this report using the following formula:

$$V_{2019} = V_{2015} \times (1 + i)^n$$

The peak hour volumes estimated for the Opening Year (2019) are depicted in **Figure 5-1**. The ADT's shown were derived from existing K-factor information provided by published VDOT traffic Data.

Horizon Year (2039) Traffic Forecast

For the Horizon Year (2039), AM & PM peak hour traffic volumes were developed by applying the average annual growth rate discussed in **Section 4** of this report using the following formula:

$$V_{2039} = V_{2015} \times (1 + i)^n$$

The peak hour volumes estimated for the Horizon Year (2039) are depicted in **Figure 5-2**. The ADT's shown were derived from existing K-factor information provided by published VDOT traffic Data.

Figure 5-1:
Opening Year (2019) Volumes
 Forecasted Peak Hour Volumes

[Note: Arrows refer to lane groups, not number of lanes, see Figure 2-2 in Section 2 for existing lane configurations]

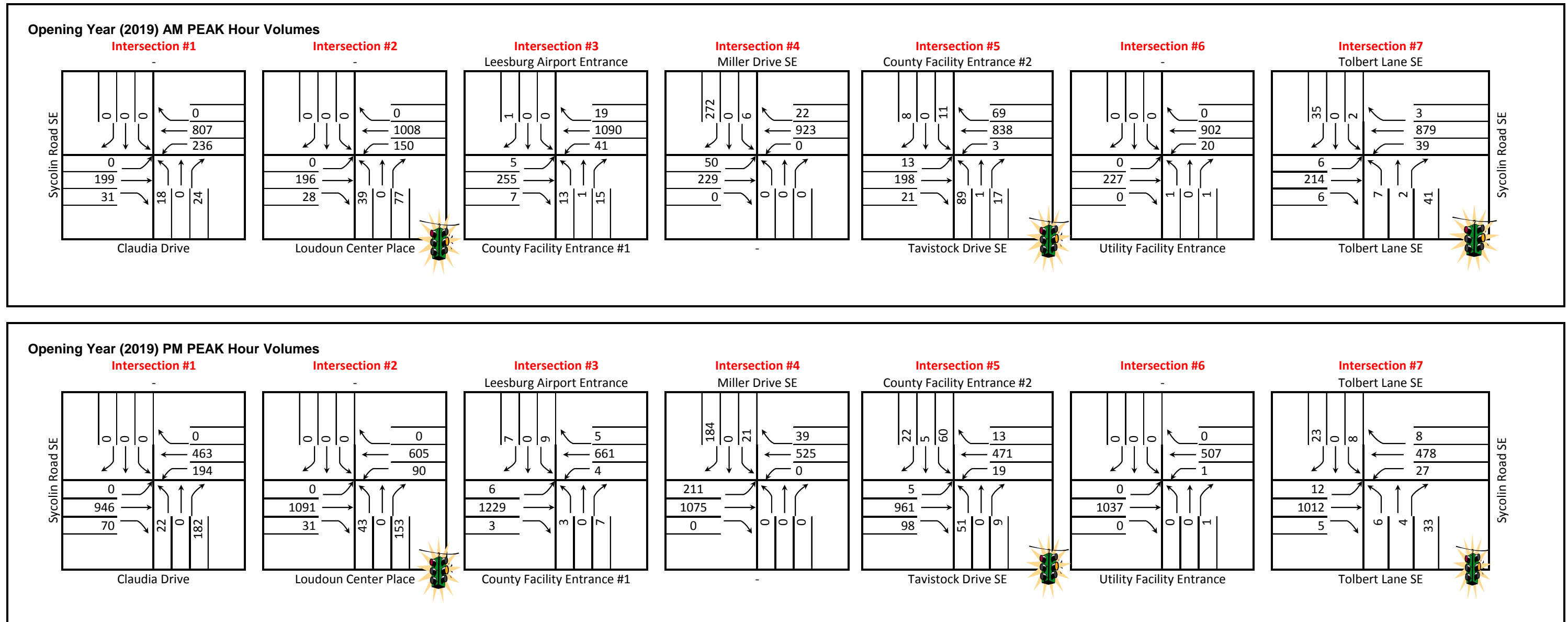
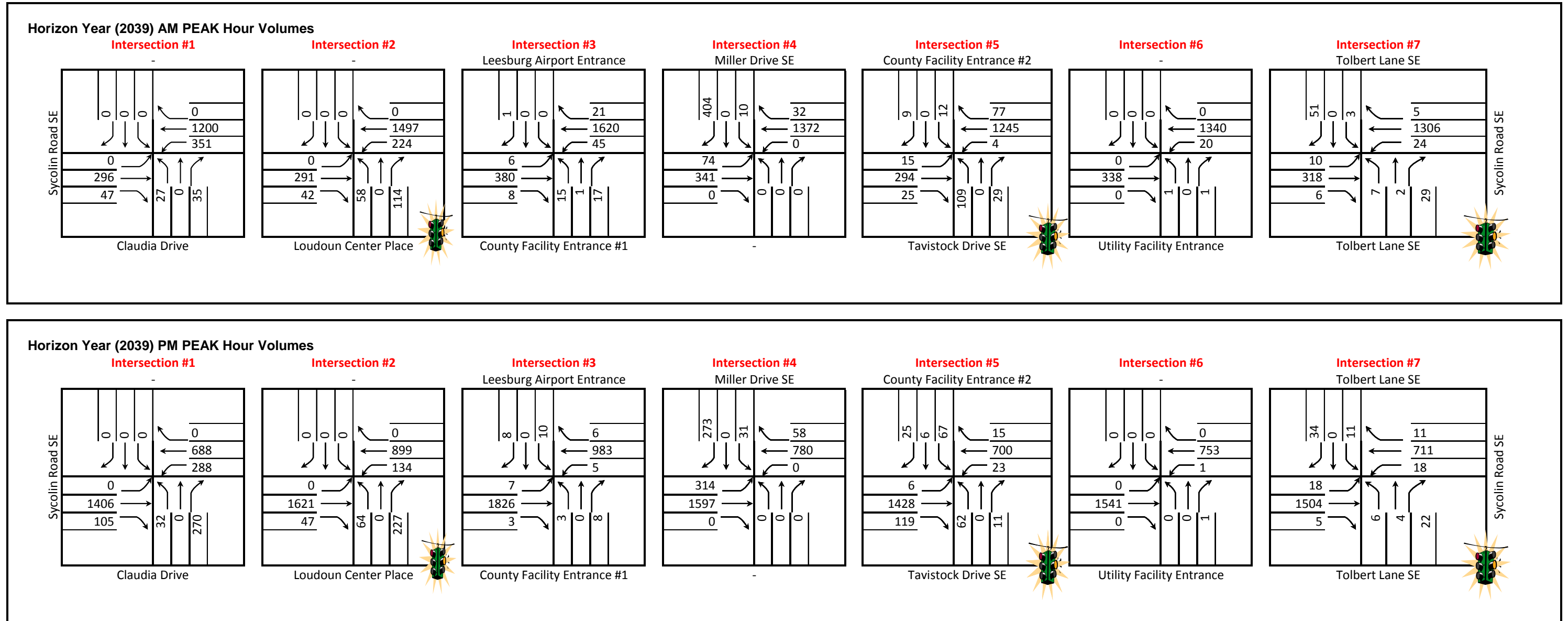


Figure 5-2:
Horizon Year (2039) Volumes
 Forecasted Peak Hour Volumes

[**Note:** Arrows refer to lane groups, not number of lanes, see **Figure 2-2** in **Section 2** for existing lane configurations]



[**Note:** Intersection #7's WB approach volumes decrease from Opening Year (2019) at the Cornerstone Chapel Site. See separate traffic study prepared by others (Wells + Associates Inc.) for details.]

Section 6

SUPPLEMENTAL REVIEWS:

For Opening Year (2019) & Horizon Year (2039)

Maintenance of Existing Intersections

Within the project's study area there are seven intersections of which five are maintained by the Town of Leesburg and two are maintained by VDOT. The breakdown is as follows:

VDOT Maintained:

Sycolin Road (Route 643) at Claudia Drive

Sycolin Road (Route 643) at Loudoun Center Place (Signalized as of 2015)

Town of Leesburg Maintained:

Sycolin Road (Route 643) at Leesburg Airport Entrance

Sycolin Road (Route 643) at Miller Drive SE

Sycolin Road (Route 643) at Tavistock Drive SE (Signalized)

Sycolin Road (Route 643) at Utility Facility Entrance

Sycolin Road (Route 643) at Tolbert Lane SE (Route 654) (Signalized)

It was requested by VDOT to add the intersection of Sycolin Road (Route 643) and Claudia Drive and the intersection of Sycolin Road (Route 643) and Tolbert Lane SE to the study area to track the volume of traffic coming in and out of the study area only. It was agreed that no further analysis was required for these two intersections since they are outside the limits/scope of physical improvements for the Sycolin Road Phase IV Widening project.

Signal Warrant Review:

Town Maintained Intersections: As discussed between the Town of Leesburg and VDOT during scoping of the traffic study, the Town of Leesburg expressed no interest in adding additional signals to any Town maintained intersections within this corridor as part of this project. The Town also expressed no interest in removing any signals. Therefore no signal warrants were conducted.

VDOT Maintained Intersections: Sycolin Road (Route 643)/Claudia Drive intersection was not required to be reviewed as discussed with VDOT during scoping of this traffic study. Sycolin Road (Route 643)/Loudoun Center Place intersection was not reviewed since VDOT recently approved the signal warrant conducted by others, and the signal was just constructed and opened to traffic this year (2015).

Roundabout Review:

Town Maintained Intersections: As discussed between the Town of Leesburg and VDOT during scoping of the traffic study, the Town of Leesburg expressed no interest in converting any intersections to a roundabout. As discussed during the scoping meeting for the traffic study, the Town submitted documentation to VDOT reaffirming this position, and copies of this documentation can be found in **Appendix F**.

VDOT Maintained Intersections: Sycolin Road (Route 643)/Claudia Drive intersection was not required to be reviewed as discussed with VDOT during scoping of this traffic study. Sycolin Road (Route 643)/Loudoun Center Place intersection was not reviewed since VDOT recently approved the signal warrant conducted by others, and the signal was just constructed and opened to traffic this year (2015). A roundabout review was not deemed prudent.

New Crossover Review:

Town Maintained Intersection: The Town of Leesburg determined that despite a crossover not being warranted due to low volumes left turns for the intersection of Sycolin Road (Route 643)/Utility Facility Entrance, which services Dominion Virginia Power and their facility yard, the proposed improvements would retain a crossover for this intersection. The reasoning is that most of the traffic from this facility comes from the north and it was not desirable to have utility trucks with utility poles making U-turns at adjacent intersections. See **Appendix F** reaffirming the Town's position.

Section 7
CAPACITY ANALYSIS OF FUTURE CONDITIONS
For Opening Year (2019) &
Horizon Year (2039)

Modeling Base for Opening Year (2019) and Horizon Year (2039):

For both the Opening Year (2019) and Horizon Year (2039), the following was implemented for the Synchro™ modeling based on existing conditions and anticipated conditions:

- All peak hour factors (PHF) were applied based on existing conditions; however no PHF less than 0.85 was applied in the interest of conservatism;
- The heavy truck percentage from existing conditions was held for future years;
- All clearance interval timings were kept “as-is”, in final design of signal modifications, interval clearance timings may be adjusted, but are anticipated to have any insignificant impact on overall traffic delays, and
- For the Build-Option(s), all signalized intersections were optimized for best timing practices.

Opening Year (2019) Capacity Analyses

Capacity analyses were performed for the study intersections for both:

1. Without proposed Sycolin Road Phase IV Widening Project improvements [No-Build Option], and
2. With proposed Sycolin Road Phase IV Widening project improvements [Build Option].

Without proposed Sycolin Road Phase IV Widening Improvements [No-Build Option] (Opening Year 2019):

The Synchro™ results are summarized and depicted in **Figure 7-1**. The Synchro™ reports are presented in **Appendix G**.

As shown in **Figure 7-1**, most of the study intersections would operate at unacceptable levels of service (i.e. LOS “D” or better is considered acceptable for urban conditions) during both AM & PM peak hours.

With proposed Sycolin Road Phase IV Widening Improvements [Build Option] (Opening Year 2019):

The Synchro™ results are summarized and depicted in **Figure 7-2**. The Synchro™ reports are presented in **Appendix G**.

As shown in **Figure 7-2**, all the study intersections would operate at acceptable levels of service (i.e. LOS “D” or better is considered “acceptable for urban conditions) during both AM & PM peak hours. It is worth noting that the intersection of Sycolin Road (Route 643)/Claudia, which is just outside the construction limits for the Sycolin Road Phase IV Widening improvements, does experience unacceptable levels of service for the side-street approach (Claudia Drive), but Sycolin Road (Route 643)’s approaches are LOS “A” for both AM and PM peak hours.

Opening Year (2019) Traffic Forecast Conclusions:

It is important to note that there are both signalized and unsignalized intersections within the study area. Overall with the proposed improvements associated with the Sycolin Road Phase IV Widening project, the corridor is expected to

experience a significant improvement in travel conditions (delay) over a scenario in which no improvements are constructed.

The following is further observed:

Signalized Intersections: In the AM Peak hour, the collective signalized intersection delay [No-Build Option vs. Build Option] decreases from 203.3 seconds to 46.6 seconds. This represents a 77% improvement in collective intersection delay for the signalized intersections for the Build Option in the AM peak hour. In the PM peak hour, the collective signalized intersection delay [No-Build Option vs. Build Option] decreases from 534.2 seconds to 71.6 seconds. This represents an 86% improvement in collective intersection delay for the signalized intersections for the Build Option in the PM peak hour.

Unsignalized Intersections: In the AM Peak hour, the collective side-street approach delay at unsignalized intersections [No-Build Option vs. Build Option] decreases from 246.7 seconds to 121.5 seconds. This represents a 51% improvement in collective side-street approach delay at the unsignalized intersections for the Build Option in the AM peak hour. In the PM Peak hour, the collective side-street approach delay at unsignalized intersections [No-Build Option vs. Build Option] decreases from 658.8 seconds to 326.4 seconds. This represents a 50% improvement in collective side-street approach delay at the unsignalized intersections for the Build Option in the PM peak hour.

Figure 7-1: Opening Year (2019)

Without proposed Sycolin Road Phase IV Widening Improvements [No-Build Option]

LOS Analysis Results

[Note: Arrows represent lane groups, not number of lanes. See Figure 2-2 in Section 2 for number of lanes]

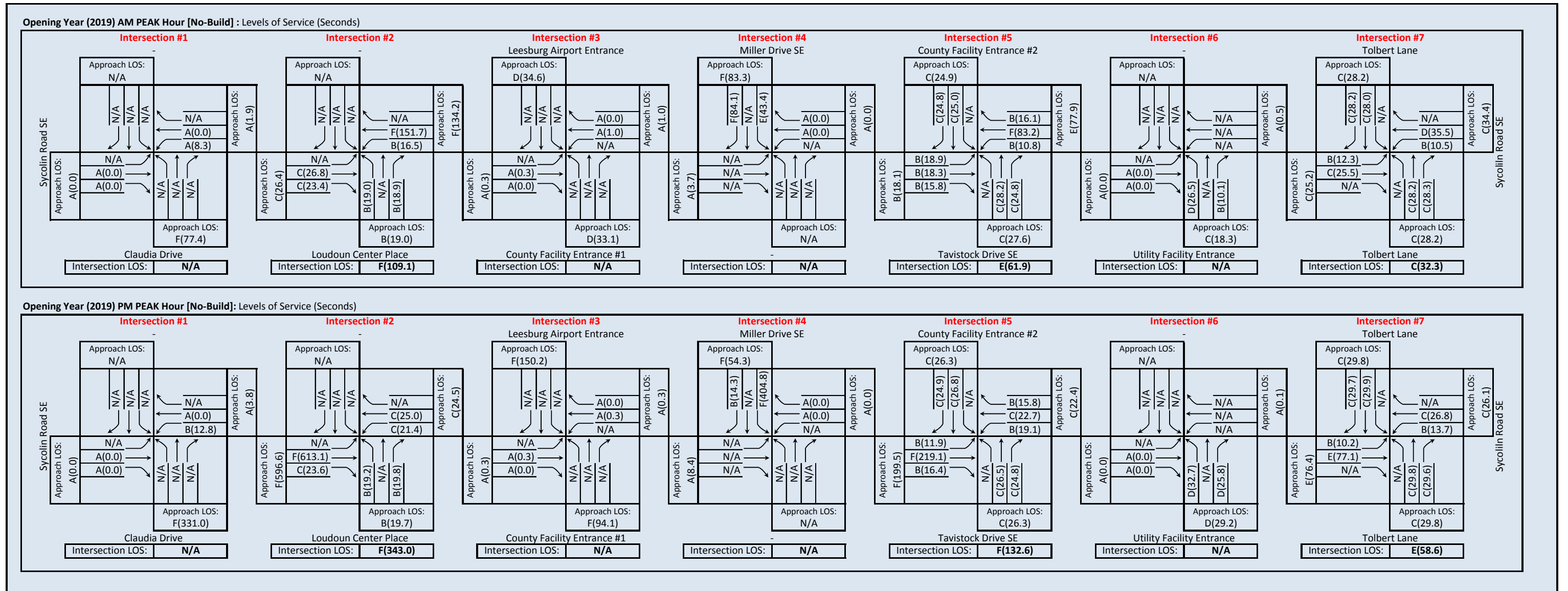
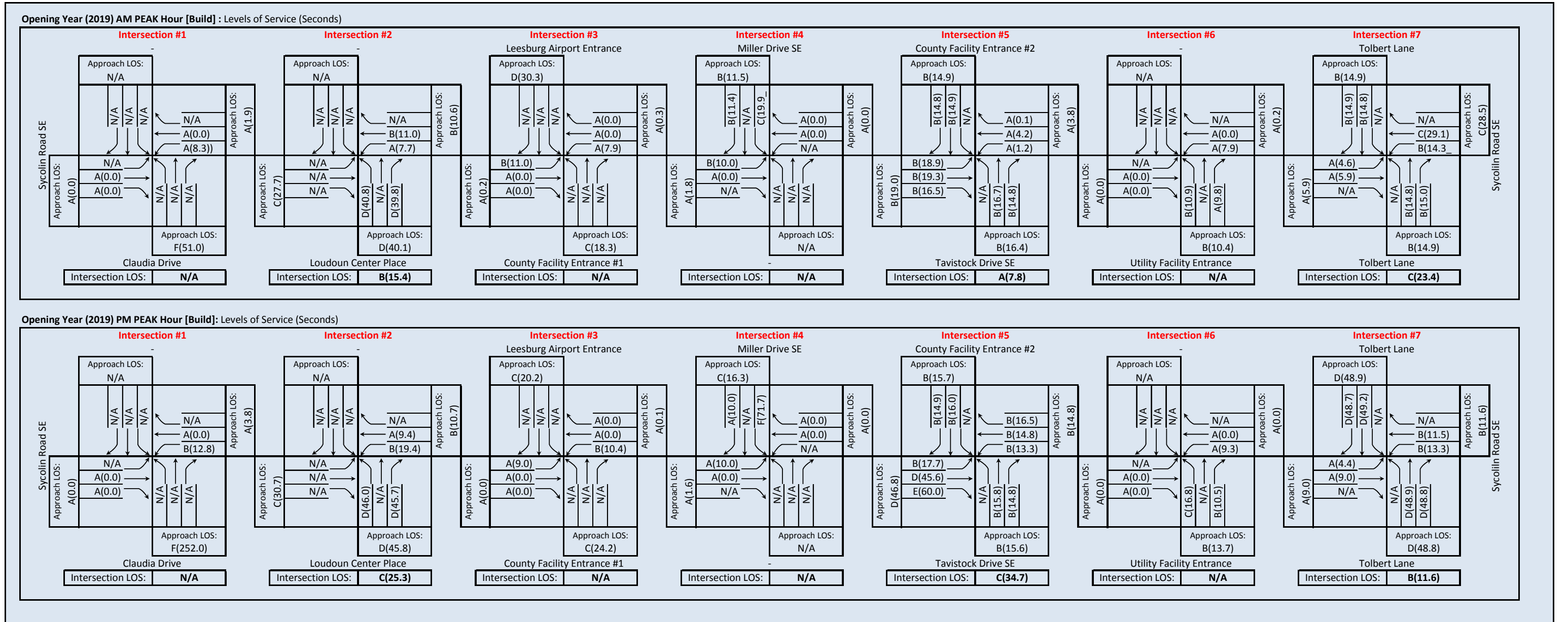


Figure 7-2: Opening Year (2019)

With proposed Sycolin Road Phase IV Widening Improvements [Build Option]

LOS Analysis Results

[Note: Arrows represent lane groups, not number of lanes. See Figure 2-2 in Section 2 for number of lanes]



Horizon Year (2039) Capacity Analyses

Capacity analyses were performed for the study intersections for both:

1. Without proposed Sycolin Road Phase IV Widening Project improvements [No-Build Option], and
2. With proposed Sycolin Road Phase IV Widening project improvements [Build Option].

Without proposed Sycolin Road Phase IV Widening Improvements [No-Build Option] (Opening Year 2039):

The Synchro™ results are summarized and depicted in **Figure 7-3**. The Synchro™ reports are presented in **Appendix H**.

As shown in **Figure 7-1**, most of the study intersections would operate at unacceptable levels of service (i.e. LOS “D” or better is considered “acceptable for urban conditions”) during both AM & PM peak hours.

With proposed Sycolin Road Phase IV Widening Improvements [Build Option] (Opening Year 2039):

The Synchro™ results are summarized and depicted in **Figure 7-4**. The Synchro™ reports are presented in **Appendix H**.

It was discussed with the Town of Leesburg, that the intersection of Sycolin Road (Route 643)/Claudia would be modeled as a signalized intersection for the Build Option in Horizon Year (2039) due to excessive delays experienced by the side-street in the no-build option. Furthermore, Loudoun County by separate study has expressed significant interest in signalizing this intersection. By solely engineering judgement, it is determined that this intersection would likely be signalized by the year 2039. No further analysis or review, or warrants will be conducted for this intersection.

As shown in **Figure 7-4**, all the study intersections impacted by construction of the Sycolin Road Phase IV Widening project would operate at acceptable levels of service (i.e. LOS “D” or better is considered “acceptable for urban conditions”) during both AM & PM peak hours. It is worth noting that the intersection of Sycolin Road (Route 643)/Claudia, which is just outside the construction limits for the Sycolin Road Phase IV Widening improvements, does experience unacceptable levels of service for the side-street approach (Claudia Drive), but Sycolin Road (Route 643)’s approach are LOS “A” for the PM peak hours. (In the event this intersection is not signalized, the LOS would be “F” for both AM and PM peak hours.)

Horizon Year (2039) Traffic Forecast Conclusions:

It is important to note that there are both signalized and unsignalized intersections within the study area. Overall with the proposed improvements associated with the Sycolin Road Phase IV Widening project, the corridor is expected to experience a significant improvement in travel conditions (delay) over a scenario in which no improvements are constructed.

The following is further observed:

Signalized Intersections: In both the AM and PM peak hours all the signalized intersections (improved as part of the Sycolin Road Phase IV Widening project) are expected to experience a significant (50% or greater) improvement in travel condition (delay) as compared to if no improvements are constructed. With the exception of the intersection of Sycolin Road (Route 643)/Claudia Drive, all signalized intersection are expected to experience a LOS “C” or better in the Build Option, as compared to that expected with the No-Build Option.

Unsignalized Intersections: In both the AM and PM peak hours all the side-street approach at unsignalized intersections (improved as part of the Sycolin Road Phase IV Widening project) are collectively expected to experience a significant (50% or greater) improvement in travel condition (delay) as compared to if no improvements are constructed.

Figure 7-3: Horizon Year (2039)

Without proposed Sycolin Road Phase IV Widening Improvements [No-Build Option]

LOS Analysis Results

[Note: Arrows represent lane groups, not number of lanes. See Figure 2-2 in Section 2 for number of lanes]

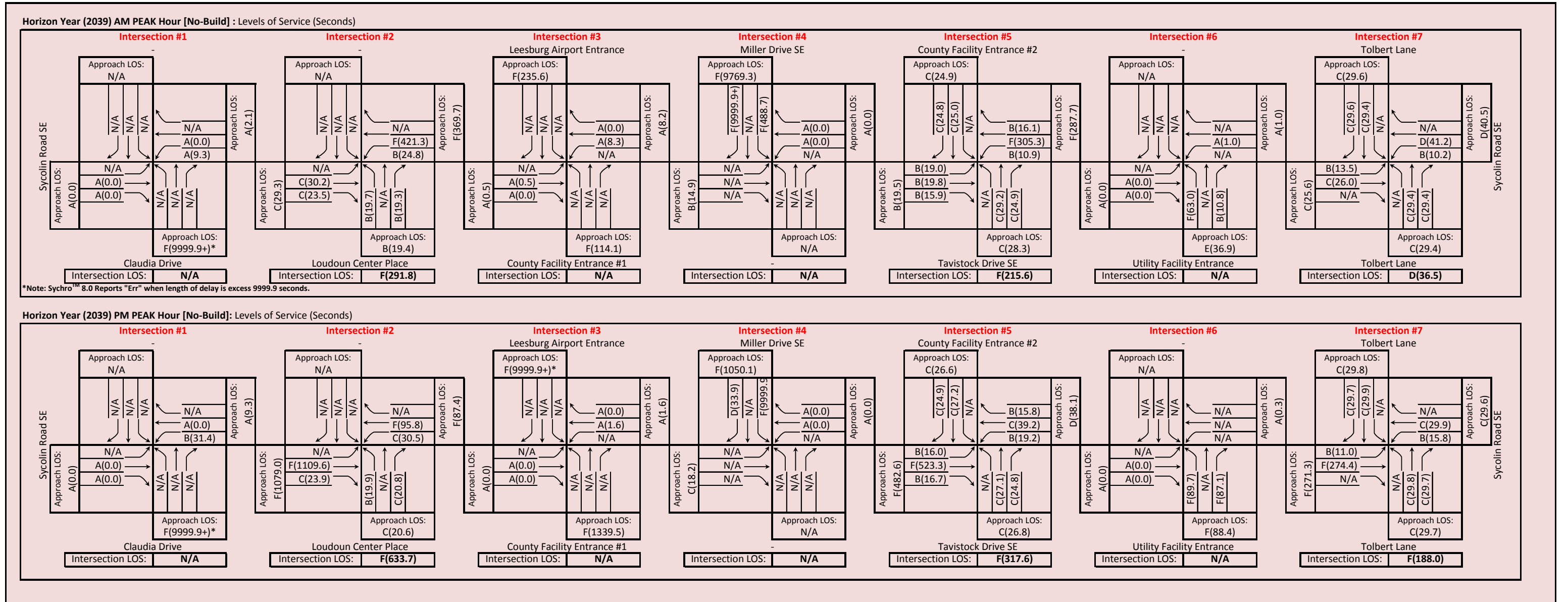
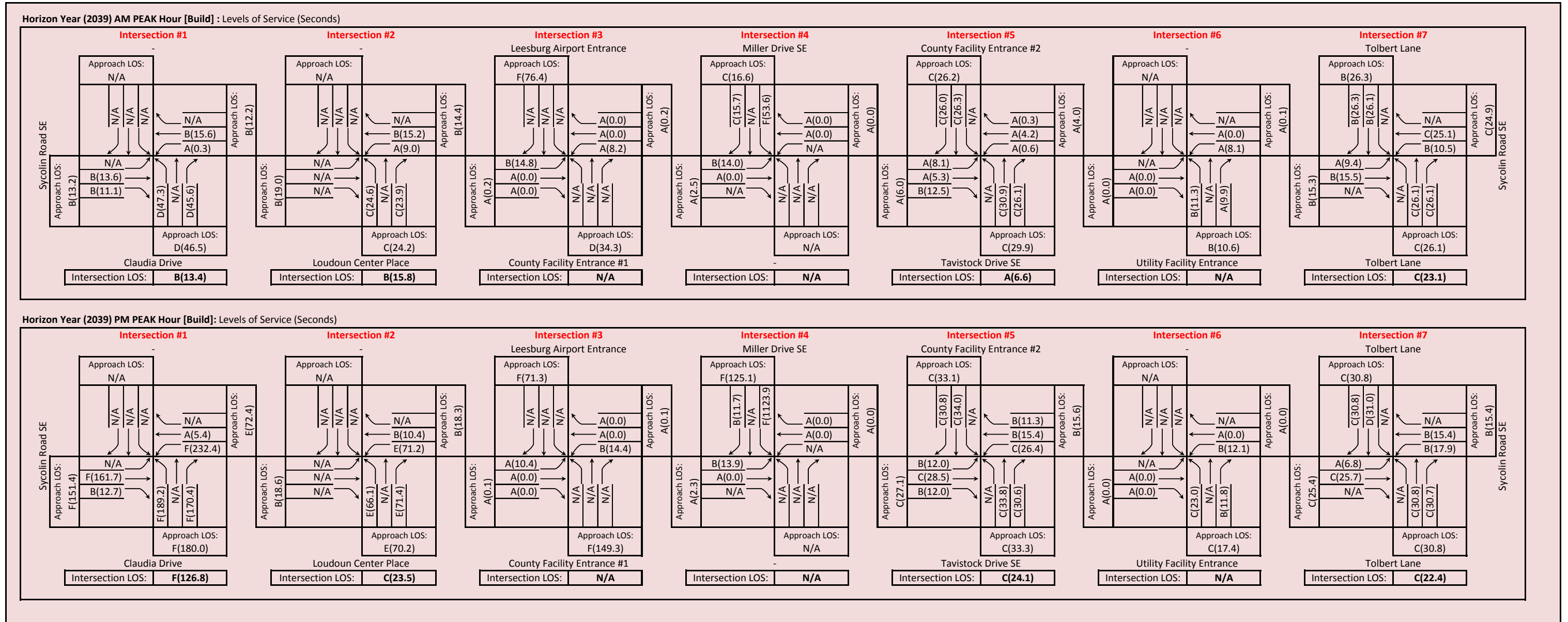


Figure 7-4: Horizon Year (2039)

With proposed Sycolin Road Phase IV Widening Improvements [Build Option]

LOS Analysis Results

[Note: Arrows represent lane groups, not number of lanes. See Figure 2-2 in Section 2 for number of lanes]



Section 8

QUEUING ANALYSIS FOR TURNING MOVEMENTS

For Horizon Year (2039) - [Design Year for Turn Lanes]

Overview

In this section, the queue length faced by vehicles is analyzed. The respective queues developed at each intersection are analyzed in this section. Queue lengths can be calculated as maximum queue length (95th percentile), average queue length (50th percentile), or field-measured queue length. The 95th percentile queue is defined to be the queue length that has only 5% probability of being exceeded during the analysis period, and it accounts for fluctuation in traffic arrival. The 95% percentile is the length best utilized to determine a proposed turn lane's length.

The following intersections are reviewed:

VDOT Maintained:

Sycolin Road (Route 643) at Loudoun Center Place (Signalized as of 2015)

Town of Leesburg Maintained:

Sycolin Road (Route 643) at Leesburg Airport Entrance

Sycolin Road (Route 643) at Miller Drive SE

Sycolin Road (Route 643) at Tavistock Drive SE (Signalized)

Sycolin Road (Route 643) at Utility Facility Entrance

[**Note:** Recall that the intersections of Sycolin Road (Route 643)/Claudia Drive and Sycolin Road (Route 643)/Tolbert Lane are outside the limits/scope of physical improvements for the Sycolin Road Phase IV Widening project and no analysis is required for these intersections.]

To model the queues, Synchro™ Sim-Traffic was used to approximate the lengths needed, based on forecasted traffic volumes for future years. The approximate queue length of each turn lane, as appropriate, for the study intersections was obtained. These approximate queue length values were analyzed in accordance proposed turn lane length shown in the current Sycolin Road Phase IV widening plans in accordance with the current VDOT Road Design Manual, Appendix F's guidelines for turn lane lengths.

[**Note:** Five 60 minute Synchro™ Sim-Traffic runs were analyzed to obtain the summary results.]

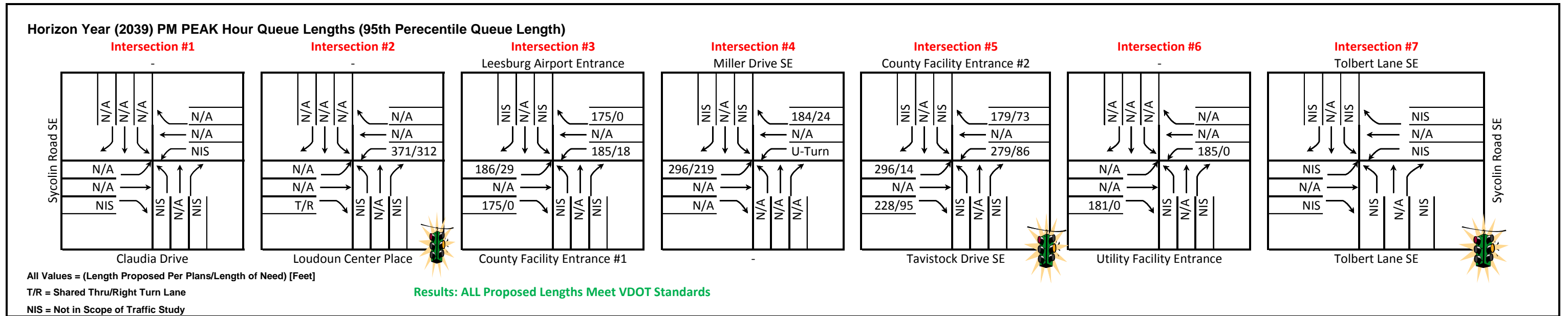
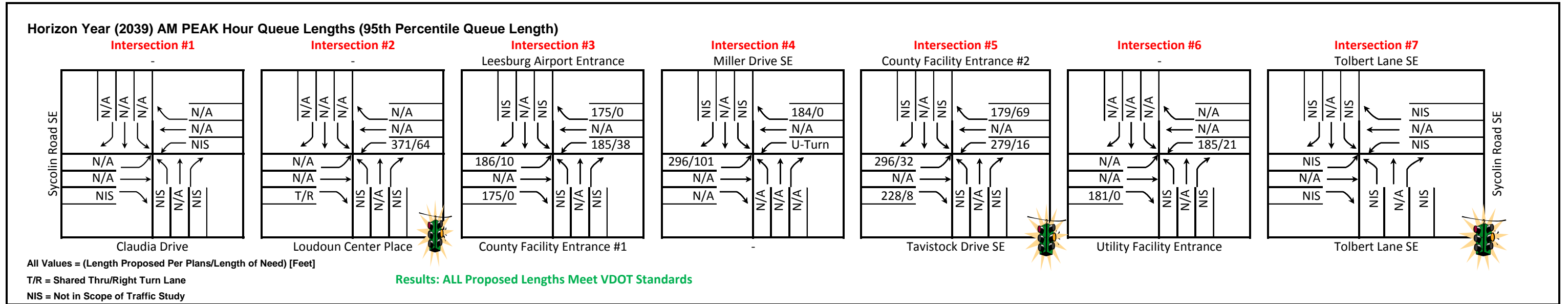
Horizon Year (2039) Queuing Analysis

Queuing analysis was conducted for both AM & PM peak hours for all study intersections. See **Appendix J** for the Synchro™ Sim-Traffic results and they are summarized in **Figure 8-1**.

Conclusions:

The proposed left turn and right turn lanes to be constructed with the Sycolin Road Phase IV Widening project will meet all Town of Leesburg and VDOT requirements, in addition to being of sufficient length to accommodate traffic into the Horizon Year 2039.

Figure 8-1: Horizon Year (2039) – Design Year for Queue Lengths
With proposed Sycolin Road Phase IV Widening Improvements [Build Option]
 Queue Length Results



Section 9

PRINCIPAL FINDINGS

The following summarizes the principal findings of this report:

Opening Year (2019) Traffic Forecast Conclusions:

It is important to note that there are both signalized and unsignalized intersections within the study area. Overall with the proposed improvements associated with the Sycolin Road Phase IV Widening project, the corridor is expected to experience a significant improvement in travel conditions (delay) over a scenario in which no improvements are constructed.

The following is further observed:

Signalized Intersections: In the AM Peak hour, the collective signalized intersection delay [No-Build Option vs. Build Option] decreases from 203.3 seconds to 46.6 seconds. This represents a 77% improvement in collective intersection delay for the signalized intersections for the Build Option in the AM peak hour. In the PM peak hour, the collective signalized intersection delay [No-Build Option vs. Build Option] decreases from 534.2 seconds to 71.6 seconds. This represents an 86% improvement in collective intersection delay for the signalized intersections for the Build Option in the PM peak hour.

Unsignalized Intersections: In the AM Peak hour, the collective side-street approach delay at unsignalized intersections [No-Build Option vs. Build Option] decreases from 246.7 seconds to 121.5 seconds. This represents a 51% improvement in collective side-street approach delay at the unsignalized intersections for the Build Option in the AM peak hour. In the PM Peak hour, the collective side-street approach delay at unsignalized intersections [No-Build Option vs. Build Option] decreases from 658.8 seconds to 326.4 seconds. This represents a 50% improvement in collective side-street approach delay at the unsignalized intersections for the Build Option in the PM peak hour.

Horizon Year (2039) Traffic Forecast Conclusions:

It is important to note that there are both signalized and unsignalized intersections within the study area. Overall with the proposed improvements associated with the Sycolin Road Phase IV Widening project, the corridor is expected to experience a significant improvement in travel conditions (delay) over a scenario in which no improvements are constructed.

The following is further observed:

Signalized Intersections: In both the AM and PM peak hours all the signalized intersections (improved as part of the Sycolin Road Phase IV Widening project) are expected to experience a significant (50% or greater) improvement in travel condition (delay) as compared to if no improvements are constructed. With the exception of the intersection of Sycolin Road (Route 643)/Claudia Drive, all signalized intersection are expected to experience a LOS "C" or better in the Build Option, as compared to that expected with the No-Build Option.

Unsignalized Intersections: In both the AM and PM peak hours all the side-street approach at unsignalized intersections (improved as part of the Sycolin Road Phase IV Widening project) are collectively expected to experience a significant (50% or greater) improvement in travel condition (delay) as compared to if no improvements are constructed.

Overall Conclusions and Recommendations:

The Town of Leesburg's Sycolin Road Phase IV Widening project is the final construction phase of a multiple phase project to improve Sycolin Road (Route 643) between the Town of Leesburg's southern corporate limits and the Leesburg Bypass (Route 7 / Route 15). As previously stated, the primary purposes of the project are as follows:

- Provide adequate roadway capacity and reduce congestion
- Improve substandard conditions along Sycolin Road (Route 643) to meet current design criteria
- Provide facilities to accommodate pedestrians and bicyclists via shared use paths, etc.

The Town's Sycolin Road Phase IV Widening project will provide for adequate roadway capacity and a reduction in congestion for future years. This is demonstrated in a comparison of the traffic volumes and travel conditions (delay) that are expected to be experienced by vehicular traffic in a No-Build Option versus the Build-Option. This accomplishes one of the primary purposes outlined by the Town for this project.

APPENDICES

Table of Contents

Appendix A: Existing Intersection Counts

Appendix B: Scoping Meeting Documents

Appendix C: Level of Service Descriptions

Appendix D: Synchro™ Reports for Existing Year (2015)

Appendix E: Extracted Pages from Cornerstone Chapel (Church) Traffic Study

Appendix F: Correspondence from the Town of Leesburg

Appendix G: Synchro™ Report for Opening Year (2019)

Appendix H: Synchro™ Report for Horizon Year (2039)

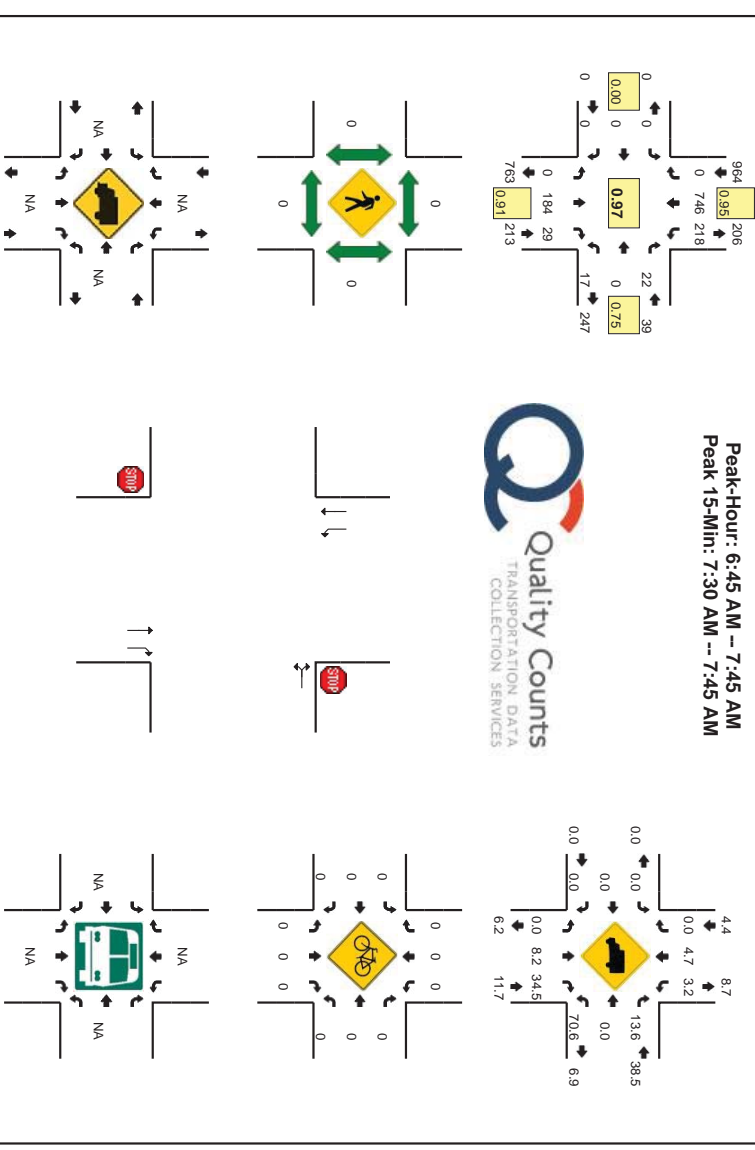
Appendix I: Intentionally Skipped

Appendix J: Synchro™ Sim-Traffic Reports

Appendix A: Existing Intersection Counts

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Claudia Dr
CITY/STATE: Leesburg, VA
QC JOB #: 13378301
DATE: Tue, May 12 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Claudia Dr (Eastbound)			Claudia Dr (Westbound)			Total Hourly Totals	
	Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right		U
6:00 AM	0	18	17	0	0	86	83	0	0	0	0	0	0	209
6:15 AM	0	30	12	0	0	63	124	0	0	0	0	0	0	233
6:30 AM	0	29	12	0	0	58	144	0	0	0	0	0	0	248
6:45 AM	0	38	8	0	0	78	171	0	0	0	0	3	0	298
7:00 AM	0	26	9	0	0	78	176	0	0	0	0	8	0	302
7:15 AM	0	56	3	0	0	33	200	0	0	0	0	7	0	302
7:30 AM	0	64	9	0	0	34	199	0	0	0	0	2	0	314
7:45 AM	0	87	3	0	0	13	188	0	0	0	0	4	0	298
8:00 AM	0	92	3	0	0	8	170	0	0	0	0	2	0	278
8:15 AM	0	96	4	0	0	8	173	0	0	0	0	2	0	1192
8:30 AM	0	80	0	0	0	3	150	0	0	0	0	4	0	241
8:45 AM	0	83	0	0	0	0	103	0	0	0	0	1	0	187

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
Flourvanes	0	256	36	0	136	796	0	0	0	0	8	0	1256
Heavy Trucks	0	16	16	0	4	36	0	0	0	0	0	4	64
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

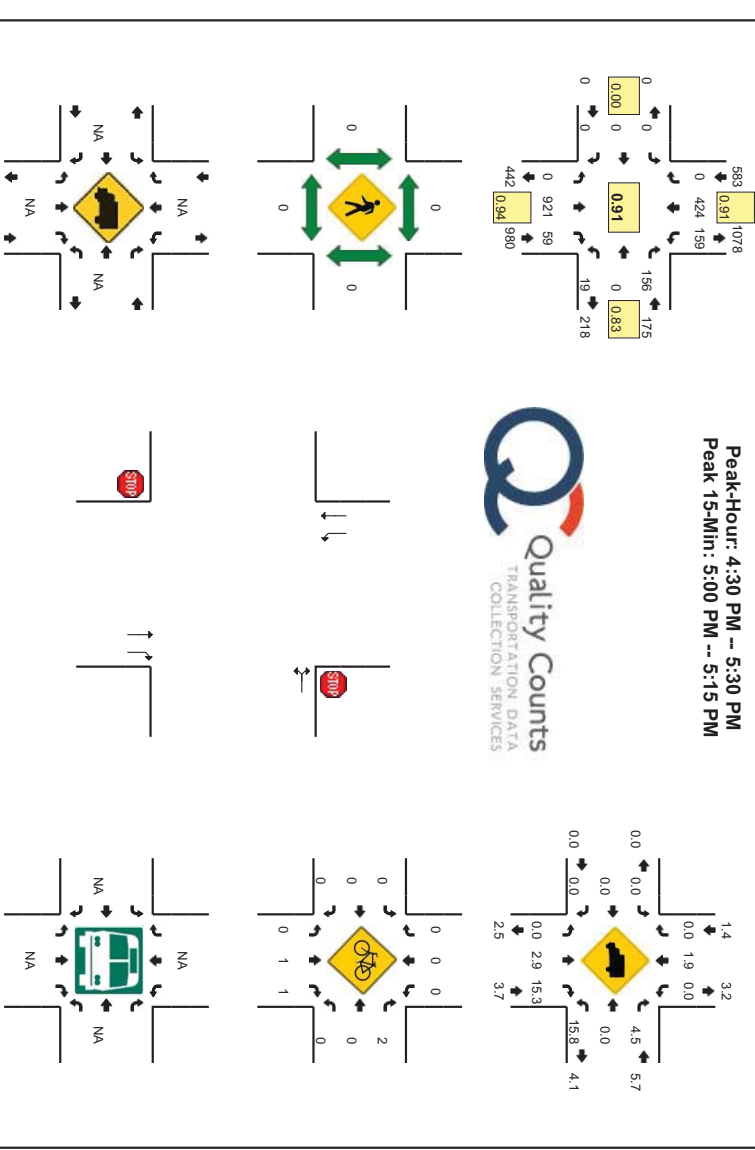
Comments:

Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Claudia Dr
CITY/STATE: Leesburg, VA
QC JOB #: 13378302
DATE: Tue, May 12 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Claudia Dr (Eastbound)			Claudia Dr (Westbound)			Total Hourly Totals	
	Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right		U
4:00 PM	0	195	2	0	0	77	0	0	0	0	0	0	0	281
4:15 PM	0	190	1	0	0	10	81	0	0	0	0	0	0	285
4:30 PM	0	242	10	0	0	16	91	0	0	0	0	4	0	379
4:45 PM	0	211	24	0	0	61	105	0	1	0	0	5	0	432
5:00 PM	0	216	15	0	0	46	120	0	0	0	0	7	0	477
5:15 PM	0	292	10	0	0	35	108	0	0	0	0	2	0	490
5:30 PM	0	195	16	0	0	37	94	0	0	0	0	6	0	375
5:45 PM	0	211	34	0	0	49	90	0	0	0	0	1	0	414
6:00 PM	0	223	35	0	0	47	89	0	0	0	0	10	0	453
6:15 PM	0	210	33	0	0	52	70	0	0	0	0	4	0	408
6:30 PM	0	152	17	0	0	49	91	0	0	0	0	15	0	374
6:45 PM	0	204	9	0	0	16	74	0	0	0	0	6	0	352

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
Flourvanes	0	864	60	0	184	480	0	0	0	0	28	0	1908
Heavy Trucks	0	12	16	0	0	0	0	0	0	0	0	0	44
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	1	0	0	0	0	0	0	0	0	0	1
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:

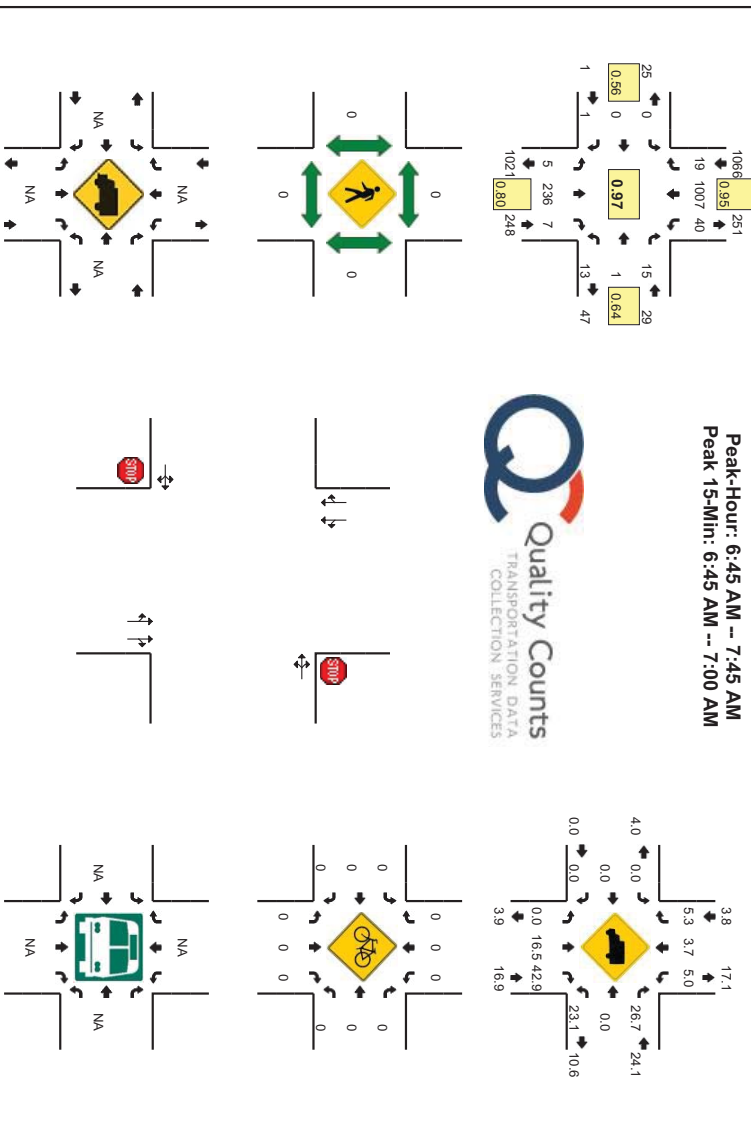
Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Airport Dwy/Warehouse Dwy
CITY/STATE: Leesburg, VA

QC JOB #: 13378305
DATE: Thu, May 14 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Airport Dwy/Warehouse Dwy (Eastbound)			Airport Dwy/Warehouse Dwy (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
6:00 AM	0	34	0	8	196	2	2	0	0	9	0	5	0	259
6:15 AM	1	37	0	15	204	3	0	0	0	7	0	5	0	272
6:30 AM	1	39	0	8	208	3	0	0	0	3	0	3	0	265
6:45 AM	0	62	1	15	260	5	0	0	0	2	0	2	0	348
7:00 AM	0	53	3	9	254	3	0	0	0	2	1	3	0	328
7:15 AM	3	59	2	10	237	6	0	0	0	2	1	3	0	323
7:30 AM	1	62	1	6	256	5	0	0	0	7	0	7	0	345
7:45 AM	2	80	1	2	210	4	0	1	0	2	0	2	0	305
8:00 AM	6	93	1	5	190	10	0	0	0	2	0	1	0	308
8:15 AM	1	63	1	3	194	7	0	0	0	5	0	1	0	279
8:30 AM	2	84	7	4	179	6	0	0	0	4	0	6	0	293
8:45 AM	9	105	3	4	167	12	0	0	0	5	0	4	0	313

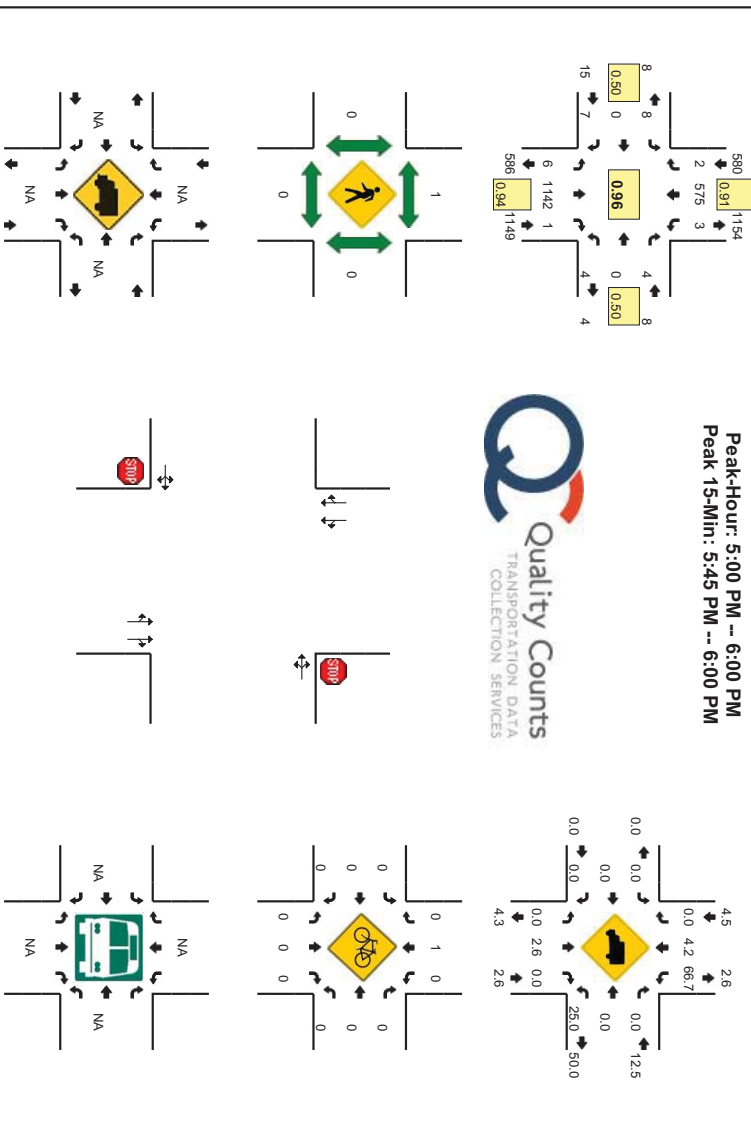
Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Floweries	4	248	4	60	1040	20	0	0	0	8	0	8	0	1392
Heavy Trucks	0	48	0	0	40	4	0	0	0	0	0	0	0	92
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Airport Dwy/Warehouse Dwy
CITY/STATE: Leesburg, VA

QC JOB #: 13378306
DATE: Wed, May 13 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Airport Dwy/Warehouse Dwy (Eastbound)			Airport Dwy/Warehouse Dwy (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	0	230	0	1	96	1	0	1	0	0	0	1	0	335
4:15 PM	0	236	1	0	90	3	0	1	0	0	0	1	0	334
4:30 PM	0	276	0	0	115	1	0	2	0	1	0	0	0	397
4:45 PM	0	286	2	0	150	4	0	2	0	1	0	0	0	449
5:00 PM	4	289	0	2	144	1	0	4	0	5	0	3	0	455
5:15 PM	2	279	0	1	146	0	0	1	0	1	0	0	0	433
5:30 PM	0	281	1	0	124	0	0	2	0	0	0	0	0	408
5:45 PM	0	293	0	0	159	1	0	1	0	1	0	0	0	456
6:00 PM	1	290	0	0	127	0	0	4	0	4	0	0	0	427
6:15 PM	1	312	1	0	126	2	0	0	0	3	0	0	0	447
6:30 PM	1	227	1	0	139	2	0	1	0	1	0	0	0	372
6:45 PM	0	206	0	1	127	4	0	1	0	1	0	0	0	345

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Floweries	0	1172	0	0	636	4	0	4	0	4	0	4	0	1824
Heavy Trucks	0	28	0	0	28	0	0	0	0	0	0	0	0	60
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

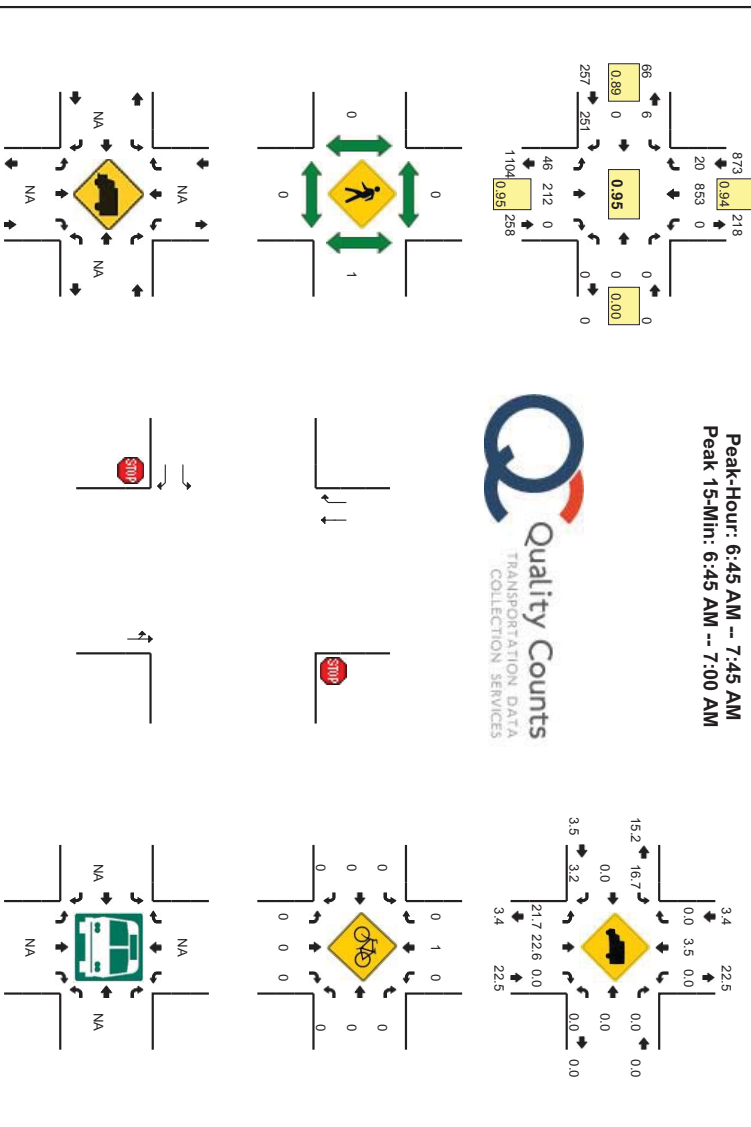
Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Miller Dr SE
CITY/STATE: Leesburg, VA

QC JOB #: 13378307
DATE: Tue, May 12 2015



15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Miller Dr SE (Eastbound)			Miller Dr SE (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Beginning At	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
6:00 AM	10	20	0	0	184	4	0	0	33	0	0	0	251	
6:15 AM	7	40	0	0	169	1	0	0	52	0	0	0	269	
6:30 AM	5	39	0	0	182	3	0	1	50	0	0	0	280	
6:45 AM	15	54	0	0	225	7	0	3	61	0	0	0	365	1165
7:00 AM	8	46	0	0	229	2	0	2	56	0	0	0	343	1257
7:15 AM	11	57	0	0	196	4	0	0	72	0	0	0	340	1328
7:30 AM	12	55	0	0	203	7	0	1	62	0	0	0	340	1388
7:45 AM	23	71	0	0	190	13	0	1	59	1	0	0	358	1381
8:00 AM	22	87	0	0	150	5	0	0	52	0	0	0	322	1360
8:15 AM	23	82	0	0	159	10	0	0	60	0	0	0	337	1357
8:30 AM	25	69	0	0	136	12	0	3	47	0	0	0	292	1309
8:45 AM	22	84	0	0	109	18	0	0	44	0	0	0	281	1232

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Flourvates	0	0	0	0	900	28	0	12	0	244	0	0	1460
Heavy Trucks	4	56	0	0	28	0	0	0	16	0	0	0	104
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	1	0	0	0	0	0	0	0	1
Railroad													
Stopped Buses													

Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

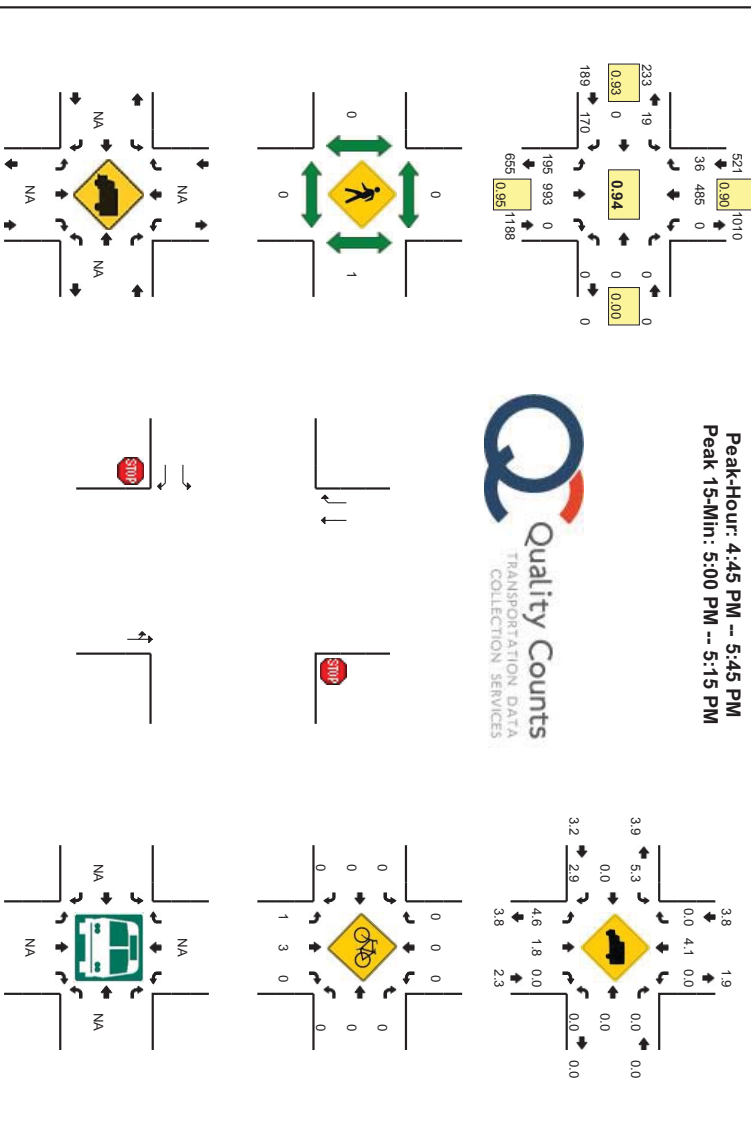
Comments:

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Miller Dr SE
CITY/STATE: Leesburg, VA

QC JOB #: 13378308
DATE: Tue, May 12 2015



15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Miller Dr SE (Eastbound)			Miller Dr SE (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Beginning At	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	48	177	0	0	69	9	0	15	0	24	0	0	342	
4:15 PM	46	192	0	0	66	6	0	8	0	23	0	0	341	
4:30 PM	74	228	0	0	82	4	0	1	0	28	0	0	417	
4:45 PM	62	241	0	0	136	7	0	3	0	48	0	0	477	1577
5:00 PM	62	252	0	0	134	10	0	2	0	43	1	0	504	1739
5:15 PM	53	264	0	0	113	10	0	7	0	44	0	0	493	1881
5:30 PM	36	236	0	0	102	9	0	5	0	35	1	0	424	1898
5:45 PM	43	207	0	0	121	10	0	7	0	21	1	0	410	1831
6:00 PM	57	241	0	0	109	6	0	6	0	32	0	0	451	1778
6:15 PM	47	219	0	0	105	15	0	9	0	28	0	0	423	1708
6:30 PM	39	188	0	0	117	16	0	12	0	49	1	0	422	1706
6:45 PM	47	210	0	0	98	3	0	7	0	29	0	0	394	1690

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Flourvates	248	1008	0	0	536	40	0	8	0	172	4	0	2016
Heavy Trucks	12	16	0	0	20	0	0	0	4	0	0	0	52
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad													
Stopped Buses													

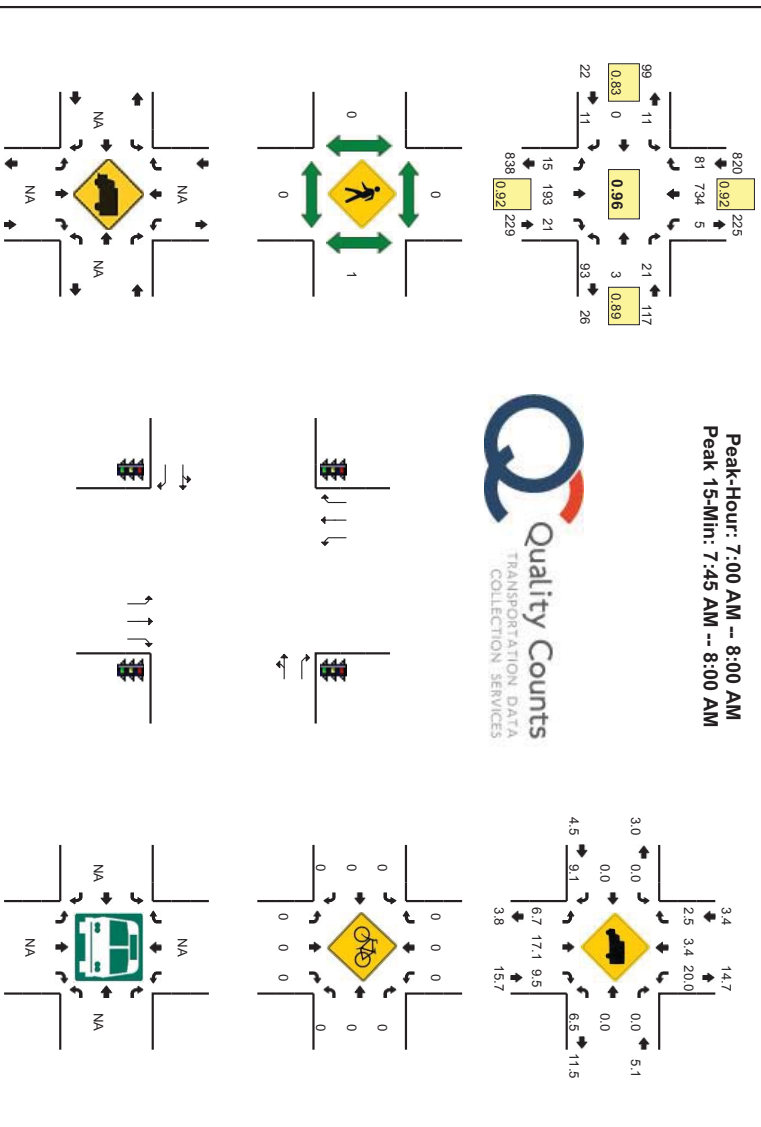
Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Comments:

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Tavistock Dr SE
 CITY/STATE: Leesburg, VA
 QC JOB #: 13378309
 DATE: Tue, May 12 2015



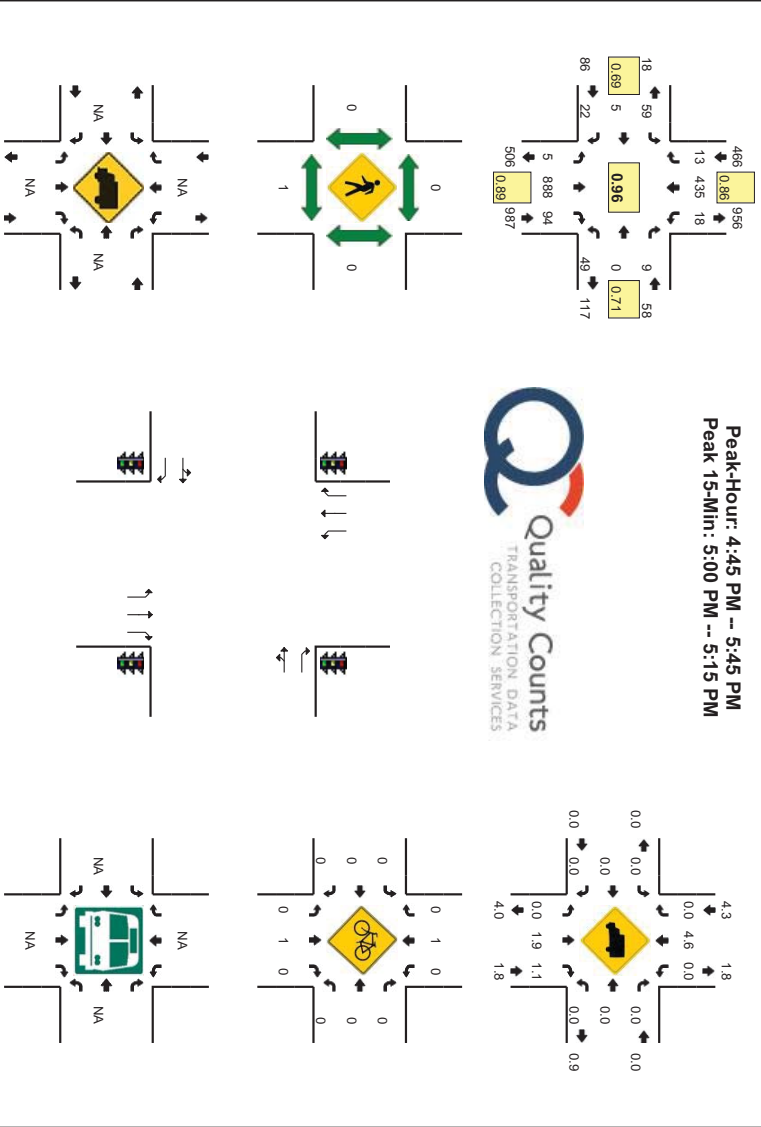
15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Tavistock Dr SE (Eastbound)			Tavistock Dr SE (Westbound)			Total	Hourly Totals	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
6:00 AM	0	19	1	0	177	5	0	0	0	15	0	0	218		
6:15 AM	1	34	1	0	153	2	0	0	0	15	0	2	211		
6:30 AM	2	36	3	0	166	8	0	1	0	18	1	4	246		
6:45 AM	3	47	7	0	216	13	0	2	0	14	0	2	305	980	
7:00 AM	0	42	2	0	207	11	0	2	0	17	0	3	287	1049	
7:15 AM	4	49	6	0	186	20	0	4	0	33	0	2	287	1125	
7:30 AM	6	45	5	0	185	24	0	3	0	22	1	9	304	1183	
7:45 AM	5	57	8	0	176	26	0	2	0	21	2	7	0	310	
8:00 AM	5	82	5	0	129	26	0	4	1	5	0	4	0	286	1187
8:15 AM	7	69	3	0	140	27	0	3	0	16	0	8	0	287	1187
8:30 AM	13	64	6	0	119	20	0	8	0	18	0	3	0	258	1141
8:45 AM	3	77	5	0	114	23	0	5	0	10	0	4	0	245	1076

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Flourvanes	20	228	32	0	8	704	104	0	8	0	16	0	84	1240
Heavy Trucks	0	20	8	0	0	32	4	0	0	0	4	0	4	72
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Tavistock Dr SE
 CITY/STATE: Leesburg, VA
 QC JOB #: 13378310
 DATE: Tue, May 12 2015



15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Tavistock Dr SE (Eastbound)			Tavistock Dr SE (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	1	175	14	0	11	68	8	0	18	2	2	0	9	312
4:15 PM	1	176	20	0	2	61	1	0	24	3	5	0	9	302
4:30 PM	1	200	19	0	1	71	3	0	10	1	7	0	5	322
4:45 PM	1	219	14	0	2	124	6	0	10	2	6	0	11	398
5:00 PM	1	214	22	0	7	108	4	0	30	1	8	0	21	418
5:15 PM	3	240	35	0	5	107	1	0	10	1	4	0	8	416
5:30 PM	0	215	23	0	4	96	2	0	9	0	2	0	2	355
5:45 PM	1	192	29	0	4	131	2	0	8	0	2	0	10	382
6:00 PM	0	214	25	0	5	94	1	0	6	0	4	0	14	357
6:15 PM	0	216	13	0	3	111	0	0	1	0	2	0	7	369
6:30 PM	0	176	18	0	2	112	2	0	2	1	5	0	6	328
6:45 PM	0	202	16	0	6	92	2	0	2	1	1	0	5	331

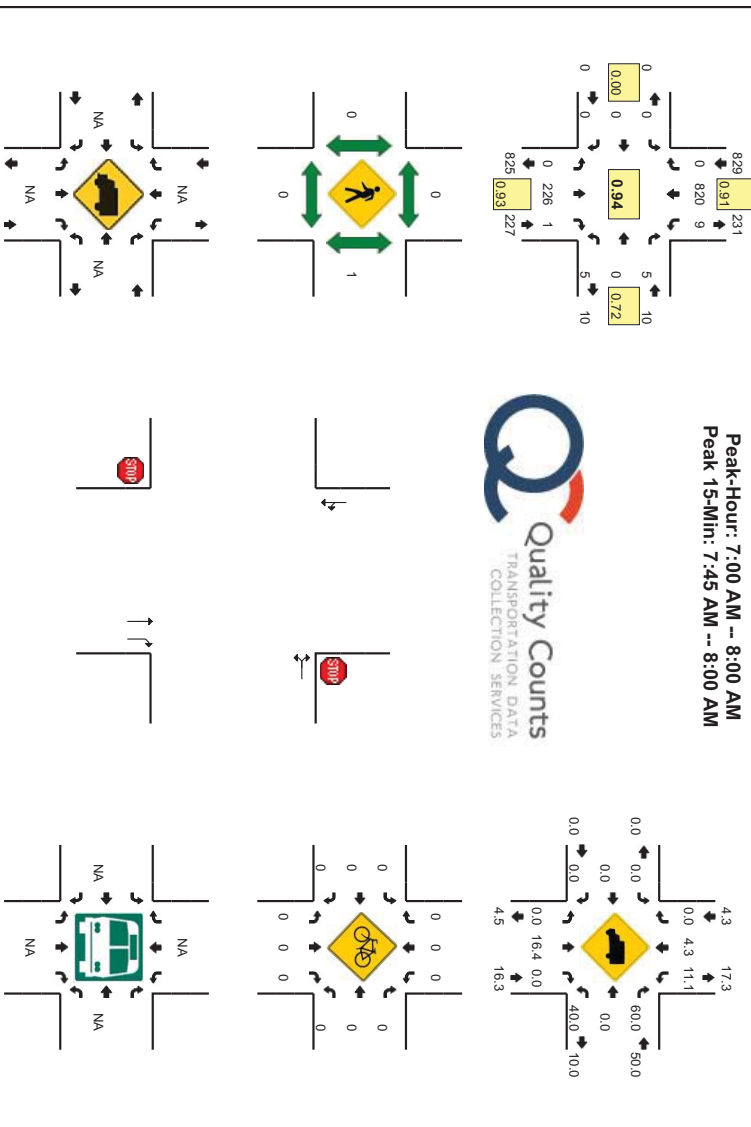
Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
All Vehicles	4	856	88	0	28	432	16	0	120	4	32	0	84	1672
Heavy Trucks	0	8	4	0	0	20	0	0	0	0	0	0	0	32
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Dominion Dwy
CITY/STATE: Leesburg, VA

QC JOB #: 13378311
DATE: Tue, May 12 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Dominion Dwy (Eastbound)			Dominion Dwy (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
6:00 AM	0	19	0	0	0	0	0	0	0	0	0	0	215	
6:15 AM	0	36	0	5	154	0	0	0	0	0	0	0	195	
6:30 AM	0	40	1	16	179	0	0	0	0	0	0	0	236	
6:45 AM	0	48	0	14	221	0	0	0	0	0	1	0	284	930
7:00 AM	0	50	0	5	223	0	0	0	0	0	0	0	278	939
7:15 AM	0	55	0	1	179	0	0	0	0	0	0	0	236	1034
7:30 AM	0	57	0	3	210	0	0	0	0	0	0	0	267	1066
7:45 AM	0	64	1	3	208	0	0	0	0	0	4	0	285	
8:00 AM	0	84	0	0	151	0	0	0	0	0	2	0	241	1029
8:15 AM	0	82	1	0	170	0	0	0	0	0	3	0	264	1057
8:30 AM	0	72	2	0	140	0	0	0	0	0	0	0	216	1006
8:45 AM	0	88	0	0	141	0	0	0	0	0	0	5	234	955

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Flourishes	0	256	4	0	0	0	0	0	0	16	0	0	1140
Heavy Trucks	0	28	0	0	4	44	0	0	0	8	0	12	96
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments:

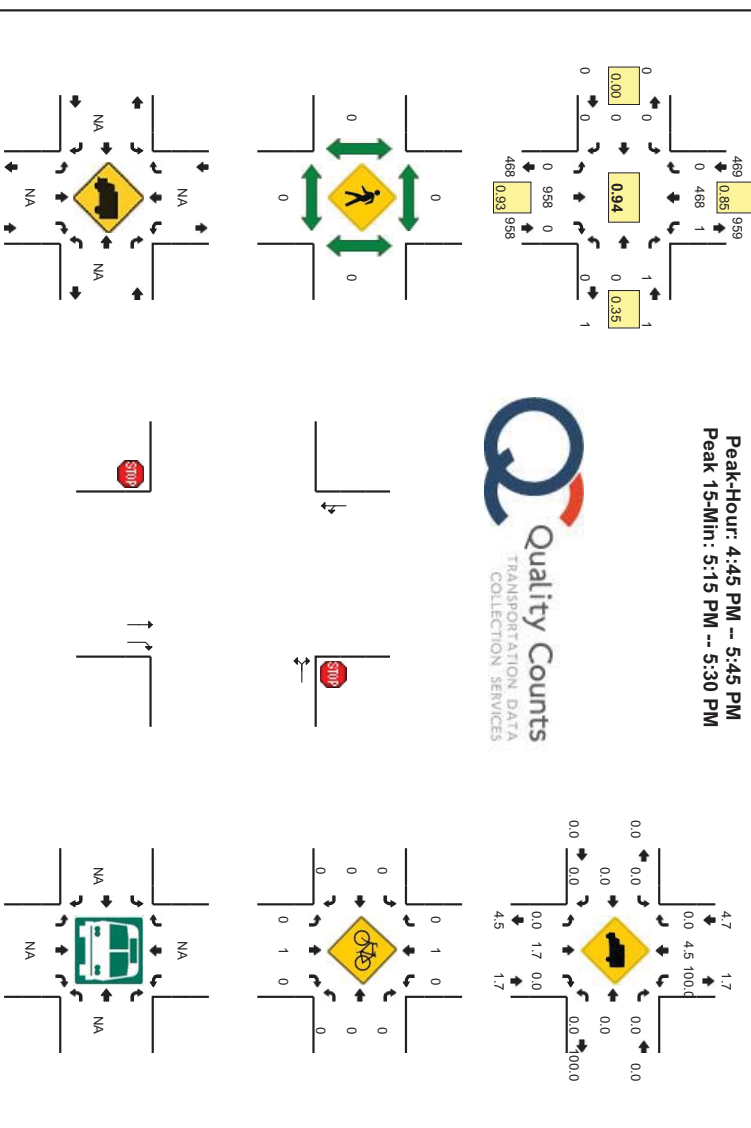
Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycollin Rd SE -- Dominion Dwy
CITY/STATE: Leesburg, VA

QC JOB #: 13378312
DATE: Tue, May 12 2015



15-Min Count Period	Sycollin Rd SE (Northbound)			Sycollin Rd SE (Southbound)			Dominion Dwy (Eastbound)			Dominion Dwy (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	0	200	0	0	85	0	0	0	0	0	1	0	286	
4:15 PM	0	200	0	0	64	0	0	0	0	0	0	1	267	
4:30 PM	0	209	0	1	74	0	0	0	0	0	1	4	299	
4:45 PM	0	237	0	0	134	0	0	0	0	0	0	0	371	1213
5:00 PM	0	238	0	0	117	0	0	0	0	0	0	0	356	1283
5:15 PM	0	238	0	0	119	0	0	0	0	0	0	1	378	1384
5:30 PM	0	225	0	0	98	0	0	0	0	0	0	0	323	1428
5:45 PM	0	207	0	0	138	0	0	0	0	0	0	0	346	1403
6:00 PM	0	223	0	0	101	0	0	0	0	0	0	0	325	1372
6:15 PM	0	221	0	0	114	0	0	0	0	0	0	1	336	1330
6:30 PM	0	190	0	0	114	0	0	0	0	0	0	0	304	1311
6:45 PM	0	209	0	0	98	0	0	0	0	0	0	0	307	1272

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Flourishes	0	1032	0	0	476	0	0	0	0	0	0	4	1512
Heavy Trucks	0	16	0	0	12	0	0	0	0	0	0	0	28
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0

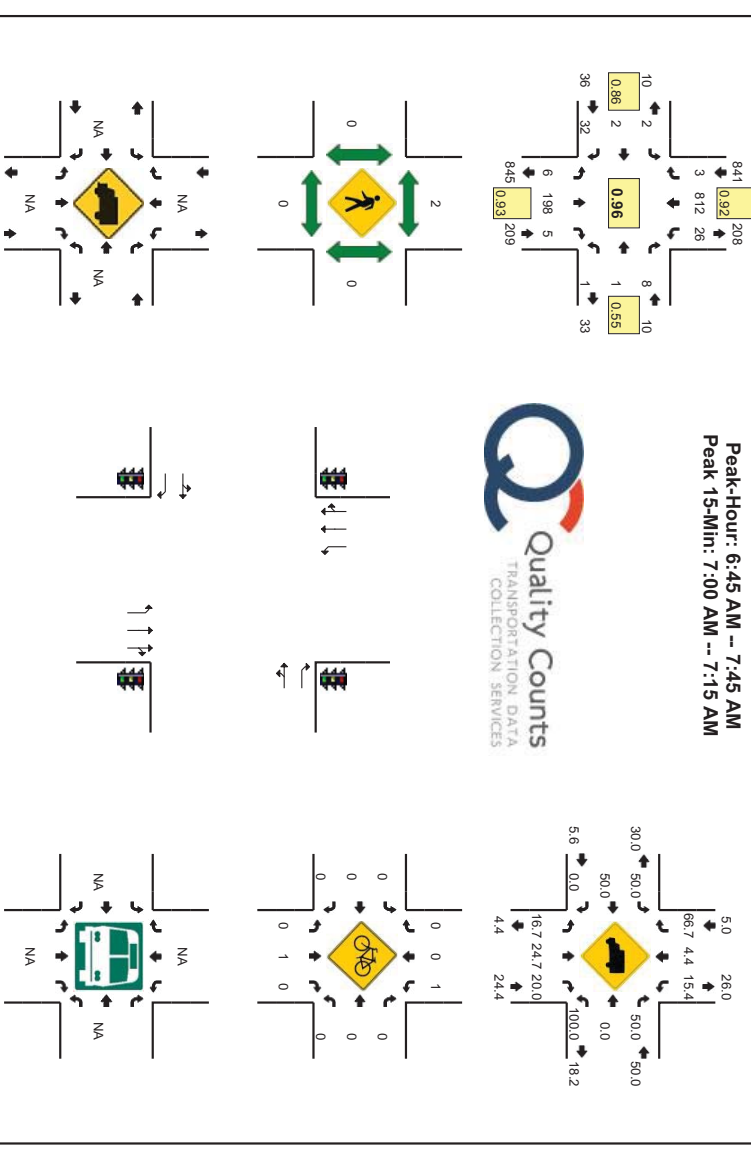
Comments:

Report generated on 5/22/2015 5:12 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Tolbert Ln SE QC JOB #: 13378313
 CITY/STATE: Leesburg, VA DATE: Tue, May 12 2015



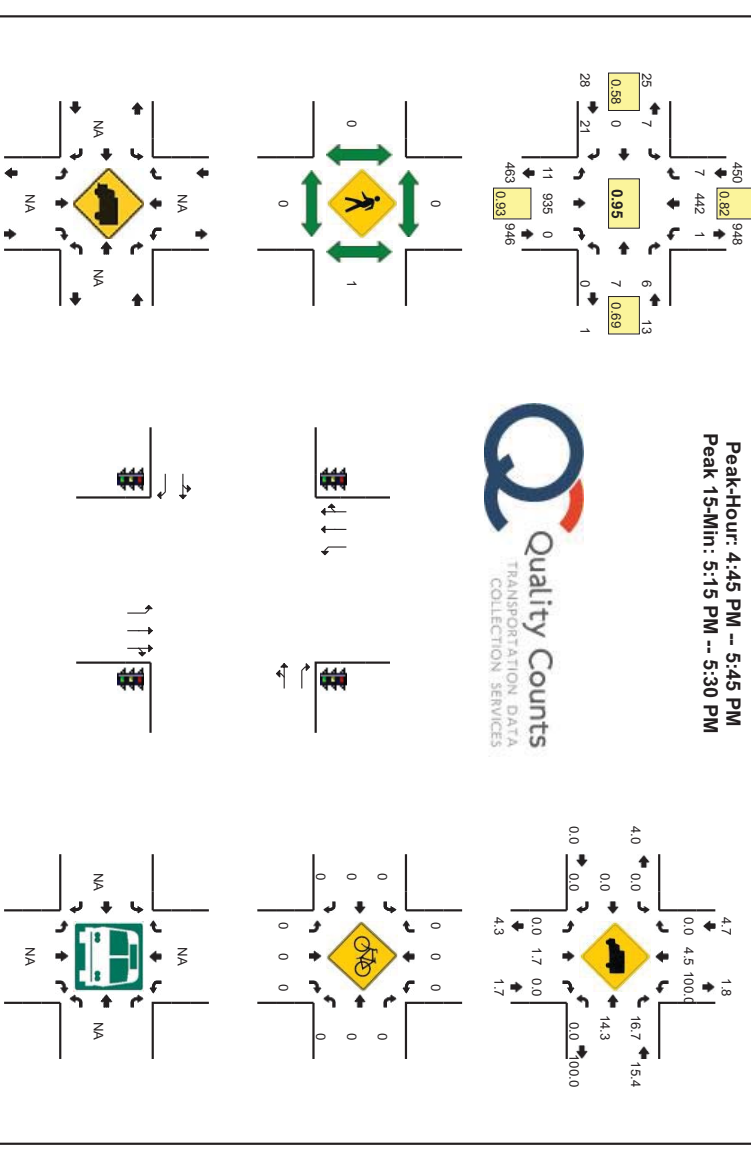
15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Tolbert Ln SE (Eastbound)			Tolbert Ln SE (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
6:00 AM	1	19	0	0	0	0	0	0	0	0	0	0	220	
6:15 AM	2	35	0	0	148	0	0	3	5	0	0	0	197	
6:30 AM	3	37	0	0	183	0	0	1	9	0	0	1	246	
6:45 AM	0	42	1	0	221	0	0	1	10	0	0	1	283	
7:00 AM	2	52	2	0	214	0	0	1	8	0	0	1	284	946
7:15 AM	1	52	2	0	175	3	0	2	0	0	0	2	232	1010
7:30 AM	3	52	0	0	202	0	0	0	0	0	0	5	277	1093
7:45 AM	4	61	1	0	198	1	0	1	6	0	0	3	280	1093
8:00 AM	5	83	1	0	132	0	0	0	8	0	0	7	246	1055
8:15 AM	4	81	0	0	158	2	0	1	0	0	0	4	262	1065
8:30 AM	2	69	1	0	131	0	0	1	6	0	0	1	214	1002
8:45 AM	4	86	0	0	133	0	0	1	4	0	0	1	231	953

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
All Vehicles	8	208	8	0	112	856	0	0	4	32	0	4	4	1136
Heavy Trucks	4	64	4	0	4	36	0	0	0	0	0	4	0	116
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments: Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak Method for determining peak hour: Total Entering Volume

LOCATION: Sycolin Rd SE -- Tolbert Ln SE QC JOB #: 13378314
 CITY/STATE: Leesburg, VA DATE: Tue, May 12 2015



15-Min Count Period	Sycolin Rd SE (Northbound)			Sycolin Rd SE (Southbound)			Tolbert Ln SE (Eastbound)			Tolbert Ln SE (Westbound)			Total	Hourly Totals
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
4:00 PM	2	198	1	0	77	1	0	1	7	0	0	2	297	
4:15 PM	4	194	1	0	59	0	0	1	1	0	0	0	274	
4:30 PM	4	205	4	0	74	0	0	2	2	0	0	1	296	
4:45 PM	5	226	0	0	136	3	0	1	0	0	0	0	376	
5:00 PM	2	240	0	0	104	1	0	2	0	0	0	4	365	1311
5:15 PM	1	284	0	0	114	2	0	2	0	0	0	1	380	1417
5:30 PM	3	215	0	0	89	1	0	2	0	0	0	1	316	1437
5:45 PM	3	205	0	0	137	3	0	0	0	1	0	0	352	1413
6:00 PM	4	216	1	0	100	2	0	0	0	0	0	0	326	1374
6:15 PM	6	215	0	0	106	2	0	1	0	0	0	2	336	1330
6:30 PM	3	192	0	0	108	0	0	1	0	0	0	0	307	1321
6:45 PM	6	202	1	0	92	0	0	0	0	1	0	0	306	1275

Peak 15-Min	Northbound			Southbound			Eastbound			Westbound			Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
All Vehicles	4	1016	0	0	456	8	0	8	0	20	0	4	4	1630
Heavy Trucks	0	20	0	0	12	0	0	0	0	0	0	0	0	32
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Comments: Report generated on 5/22/2015 5:12 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix B: Scoping Meeting Documents



Rinker Design Associates, P.C.

Engineering * Surveying * Land Planning * Forensic
Transportation * Environmental * Traffic

9385 Discovery Blvd., Suite 200

Manassas, VA 20109

Local: (703) 368-7373

Fax: (703) 257-5443

UPC 102895, Sycolin Road Phase IV: Traffic Study Scoping Meeting

Meeting Date: April 21, 2015

Meeting Location: VDOT, Northern Virginia District Office

Attendees:

- ◆ **Town of Leesburg, Capital Projects:**
 - Anne Geiger, Project Manager
- ◆ **Virginia Department Of Transportation:**
 - Susie Lue, LAP Project Manager
 - Xuejun Fan, Traffic Engineering
- ◆ **Rinker Design Associates:**
 - Adam Welschenbach, Traffic Engineer
 - Sohlab Qadir, Project Engineer

Purpose:

- ◆ Discuss scope and limits of Traffic Impact Analysis Study for Sycolin Road Phase IV.

Project Scope/Information:

- ◆ This project proposes to widen approximately 3,400 LF of Sycolin Road from a 2-lane road to a 4-lane road from approximately 500 feet south of Tolbert Lane to the Town's Corporate Limits (located approximately 300' north of Loudoun Center Place).
- ◆ Within the project site, Sycolin Road is maintained by the Town of Leesburg from the northern project limits to the Town of Leesburg's southern Corporate Limits.
- ◆ Outside of the Town's Limits (Loudoun County), Sycolin Road is VDOT maintained.
- ◆ There are currently two existing signalized intersections within the project limits (Sycolin Rd / Tolbert Lane and Sycolin Rd / Tavistock Drive) and both are Town maintained.
- ◆ There is also one future signal to be installed by others (Loudoun County, VDOT Maintained) at Sycolin Road / Loudoun Center Place. This signal is currently under construction.

Traffic Counts:

- ◆ Traffic Counts shall be performed for AM/PM at the following intersections:
 1. Sycolin Road (Rte. 643) @ Tolbert Lane SE
 2. Sycolin Road (Rte. 643) @ Commercial Entrance (Dominion VA Power)
 - To be determined based on Town internal discussions about access. (Town to follow up with RDA.)
 3. Sycolin Road (Rte. 643) @ Tavistock Drive SE
 4. Sycolin Road (Rte. 643) @ Miller Drive SE
 5. Sycolin Road (Rte. 643) @ Commercial Entrance (Airport / Central Warehouse)
 6. Sycolin Road (Rte. 643) @ Loudoun Center Place
 7. Sycolin Road (Rte. 643) @ Claudia Drive

Growth Rate:

- ◆ ~~Growth Rate of 4.5% listed in the Traffic Impact Analysis Scope Agreement was established through coordination between RDA and Town of Leesburg. (See Final Determination below)~~
 - ~~Published ADI volumes for the past 3 years indicate little to no growth.~~
 - ~~No known growth or development expected along Sycolin Road.~~
- ◆ VDOT recommends reviewing growth rate for past construction projects along Sycolin Road for comparison.

Page 1 of 2

V:\140721\102895-Project Documents\Meetings\2015-04-21 Traffic Scoping\2015-04-21 Traffic Scoping Minutes.doc

- Town of Leesburg is to look into and provide information from the Sycolin Rd Phases I thru III projects.
- VDOT is to coordinate with VDOT Planning and provide information for Sycolin Rd Bridge over Rte. 7 / Rte. 15 Bypass project.
- ◆ **Final Resolution/Determination** (Post Meeting), based on surrounding project and VDOT planning recommendation a 2% growth rate shall be utilized for Sycolin Road on project.

Roundabout Study:

- ◆ Town of Leesburg does not feel roundabouts are appropriate on the Town maintained portion of Sycolin Road within the project limits.
- ◆ For intersections within Town Limits (Town Maintained):
 - Provide a brief reasoning / justification for why roundabouts will not be provided in lieu of a detailed roundabout study.
 - Town of Leesburg to provide a formal letter for their position on roundabouts for this project. The letter shall be inserted as an appendix in the Traffic Study.
- ◆ For intersections outside Town Limits (VDOT Maintained):
 - There are two intersections along Sycolin Road outside of Town Limits:
 - **Sycolin Road / Loudoun Center Drive Intersection**
 - ❖ This project proposes only resurfacing and restriping operations at this intersection. Therefore, per VDOT TE, a roundabout study at this intersection will not be needed.
 - ❖ A signal (by Loudoun County) at this intersection is currently under construction. The signal shall be VDOT maintained.
 - VDOT is to look into signal warrant or study for this intersection.
 - **Sycolin Road / Claudia Drive Intersection**
 - ❖ This project does not propose any significant work at this intersection. Therefore, per VDOT TE, a roundabout study at this intersection will not be needed.

Traffic Signals / Signal Modifications

- ◆ Sycolin Road / Tolbert Lane – No Signal Modifications Req'd
 - The project terminates south of this intersection. Impacts to signal are not anticipated.
- ◆ Sycolin Road / Tavistock Drive – Signal Modifications Req'd
 - Needed due to added travel lanes / alignment
- ◆ Sycolin Road / Loudoun Center Place – Limited Signal Modifications Req'd
 - Proposed signal head alignment/configuration (by others) seems to accommodate the ultimate 4-lane roadway section.
 - Modifications may only be limited to adding additional traffic loops for opening up travel lanes (currently striped out) and replacing existing loops.
 - Signal Timings will be submitted.
- ◆ No new signals are proposed with this project.
- ◆ No existing intersections will be evaluated for signal warrants.

Additional Analysis at Intersections

- ◆ The following additional analysis will be provided at intersections:
 - Queue Lengths
 - Intersection LOS (no build vs build option)
 - Turn Lane Lengths as requested by VDOT
 - Turn Lanes are to follow VDOT Policy (Length per capacity analysis plus taper)
 - RDA to look into AASHTO turn lane policy
 - **Final Determination (Post Meeting):** RDA confirms VDOT's Policy meets AASHTO minimum.

Page 2 of 2



Rinker Design Associates, P.C.

Cc: Beacher, Andrew (VDOT); Fan, Xuejun (VDOT)
Subject: RE: Sycolin Rd. IV, UPC 102895 - traffic study growth rate

As requested, I reviewed two models' output one by Town of Leesburg and one by MWCOG. Applying "screenline" technique showed (see table below) the traffic to grow at the **rate of 2%** compounded annually across the screenline. The screenline included Sycolin Road, Greenway, Evergreens Mill Road and US 15 (S. King Street).

TOWN	ADT		MWCOG	ADT
2008	92,526		2015	51,776
2030	143,523		2030	73,703
ACG	2.02%		ACG	2.38%

ACG : Annually Compounded Growth

Please feel free to contact me directly should you have any questions.

Thank you,
Cina S. Dabestani
Sr. Transportation Engineer
Transportation Planning
Virginia Department of Transportation
703 . 259 . 2991
Cina.Dabestani@VDOT.Virginia.GOV



Please consider the environment before printing this email

From: Trivedi, Rahul, P.E. (VDOT)
Sent: Wednesday, April 22, 2015 3:46 PM
To: Lue, Susie (VDOT)
Cc: Beacher, Andrew (VDOT); Dabestani, Cina (VDOT); Fan, Xuejun (VDOT)
Subject: RE: Sycolin Rd. IV, UPC 102895 - traffic study growth rate

Susie,

Since Cina is very familiar with the Town of Leesburg Model he will respond to your request.

Thanks.

Rahul

2

Sincerely,

Rahul Trivedi

Rahul Trivedi P.E.

VDOT, Northern Virginia District
Transportation Planning Section
4975 Alliance Drive, Fairfax, VA 22030
Phone-703-259-2308

From: Lue, Susie (VDOT)
Sent: Wednesday, April 22, 2015 3:20 PM
To: Fan, Xuejun (VDOT); 'Anne Geiger'; Welschenbach, Adam (VDOT)
Cc: Trivedi, Rahul, P.E. (VDOT)
Subject: RE: Sycolin Rd. IV, UPC 102895 - traffic study growth rate

Rahul,

What growth rate would you suggest, 1.5% or 2%? If you need more project information, please feel free to contact me.

Thank you - Susie

Susie Lue | Virginia Department of Transportation | NOVA Local Assistance | Phone 703-259-2918 | Susie.Lue@VDOT.Virginia.gov

From: Fan, Xuejun (VDOT)
Sent: Wednesday, April 22, 2015 3:12 PM
To: Lue, Susie (VDOT); 'Anne Geiger'; Welschenbach, Adam (VDOT)
Cc: Trivedi, Rahul, P.E. (VDOT)
Subject: RE: Sycolin Rd. IV - traffic study growth rate

Susie,

I suggest checking with Rahul at Transportation Planning regarding the growth rate. Rahul will have more information about it or direct you to the right staff. I'm copying Rahul on the email so that he'll be aware of this.

Thanks.

3

Xuejun

From: Lue, Susie (VDOT)
Sent: Wednesday, April 22, 2015 3:05 PM
To: 'Anne Geiger'; Fan, Xuejun (VDOT); Welschenbach, Adam (VDOT)
Cc: 'Calvin Grow'
Subject: RE: Sycolin Rd. IV - traffic study growth rate

Anne,

I thought that normally 2% is used.

Xuejun,
What would be your recommendation?

Thanks -

Susie Lue | Virginia Department of Transportation | NOVA Local Assistance | Phone 703-259-2918 | Susie.Lue@VDOT.Virginia.gov

From: Anne Geiger [<mailto:AGeiger@LEESBURGVA.GOV>]
Sent: Wednesday, April 22, 2015 2:43 PM
To: Lue, Susie (VDOT); Fan, Xuejun (VDOT); Welschenbach, Adam (VDOT)
Cc: Calvin Grow
Subject: Sycolin Rd. IV - traffic study growth rate

All

We were unable to find any of the traffic studies for Sycolin Road Phases 1-3, but we found the study for Loudoun County Support Center dated 3/12/12 (@ Loudoun Center Place off of Sycolin Road). It used a 2% growth rate. Is this growth rate acceptable to VDOT?

Regards,

Anne Geiger

Anne D. Geiger, P.E., Project Manager
Office of Capital Projects
Town of Leesburg, Virginia

4

25 W. Market St., Leesburg, VA 20176-2901
703.771.2742 (office) 703.737.7065 (fax)
AGeiger@LeesburgVA.gov
Respectful of the past, mindful of the future

5



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**

CONTACT INFORMATION

Consultant Name: Rinker Design Associates, P.C.
 Company: Attn: Adam Welschenbach
 Telephone: (703) 368-7373
 Email: awelschenbach@rdachvil.com

Applicant/Rep: Anne Geliger
 Company: Town of Leesburg
 Telephone: (703) 771-2742
 Email: ageliger@leesburgva.gov

PROJECT INFORMATION

Project Name: Sycolin Road Widening - Phase IV (VDOT UPC 102895)
 Project Address: N/A (Tolbert to Town line), Rte 643

Application Type: Town Plan Rezoning Special Exception Site Plan Operations X

Project Description: (Include details on land use, acreage, access, etc. Attach additional sheets if necessary)
 Rte 643 (Sycolin Rd) to be widened to a 4 lane divided facility from Tolbert Lane to South Town line.

Proposed Use(s): Residential Commercial Mixed Use Other

Trip Generation: N/A for roadway traffic operations report.

ITE Code	Land Use	Variable (SQ FT / EMPS / STUDENTS / SEATS)

Total (In/Out) Peak Hour Trip Generation
 < 100 100-499 500-999 1,000 +

TRAFFIC IMPACT ANALYSIS ASSUMPTIONS

Current Year: 2015 Build Out Year: 2018 (Opening Year) Design Year: 2038 (Herdon Year)

STUDY YEARS



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**

STUDY AREA BOUNDARIES

(Shall extend to the point at which site-generated traffic is 15% or less of total roadway volume, excluding site traffic. Attach Map)

North: Tolbert Lane SE
 West: N/A
 East: N/A
 South: Claudia Drive

EXTERNAL FACTORS THAT COULD AFFECT PROJECT

(Planned road improvements, approved nearby development)
 None are known at this time

EXISTING TRAFFIC DATA TO BE UTILIZED

(Historical, Town Forecasts)
 Will utilize VDOT & TOL historical traffic volumes available, in addition to obtaining current traffic volumes.

TRIP DISTRIBUTION (Attach Graphic)

Road Name: _____

	N	S	E	W
* No known outside factors coming online, so no ITE trips and no trip distribution needed at this time.				

% of distribution

Annual Vehicle Trip Growth Rate: 1.5% (2015 - 2018) } 2016 per Scoping Mtg
 Additional Notes: 0.5% (2018 - 2038)

ADT 2012 = 13,000
 ADT 2013 = 13,000
 ADT 2011 = 13,000



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**

Peak Period to be Analyzed: AM PM SAT SUN
(Check all that apply)

Peak Hour of Generator: _____ AM PM

Study Intersections

1. Rte 643 @ Tolbert Ln SE at _____
2. Rte 643 @ Tavistock Dr SE at _____
3. Rte 643 @ Miller Dr SE at _____
4. Rte 643 @ Commercial Driveway at _____
5. Rte 643 @ Loudoun Center Pl at _____
6. Rte 643 @ Claudia Dr at _____
7. Rte 432 @ Downin at _____
8. _____ at _____
9. _____ at _____
10. _____ at _____

TRIP ADJUSTMENT FACTORS

Internal Capture: NO YES If Yes _____ % Land Use: _____
Pass By: NO YES If Yes _____ % Land Use: _____

Software Methodology: Synchro (8.0) HCS Other

Traffic Signals Proposed or Affected:

(Identify intersection and analysis software to be used in analysis)

- No signals are proposed with this project.
- No existing intersections will be eval. for warrants.

Other Mitigation Proposed:

None

Existing Background Traffic Studies to be Utilized:

None, unless the Town requests we utilize any.

Additional Analysis Required:

- Queuing Merging Actuation / Coordination Bike / Pedestrian
- Weaving TDM Measures Other Intersection LOS (no build vs. build option)

Total Number of Pages of Scoping Agreement, Including Attachments: 6



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**



Attached Map of Roadway (Rte. 643)



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**

List of Scope Exclusions:

- Roundabout Study for any intersection (VDOT RDM, Appendix F)
- Any Signal Warrants
- Will only review, analyze and provide existing counts for the listed ~~six (6)~~ ^{seven (7)} study intersections
- This report is an operations report only, not to justify the construction of the roadway. (A comparison of no-build scenario vs. a build scenario to show the improvements.)
- No other than scenarios other than widening the roadway to four lanes will be reviewed/analyzed.
- No outside factors will/shall be considered, unless requested by the Town prior to the first submission.
 - No background sites are known at this time and no nearby projects that would alter the traffic are known.



**TOWN OF LEESBURG
TRAFFIC IMPACT ANALYSIS SCOPE AGREEMENT**

IN ADDITION TO THE SCOPE OF STUDY SPECIFIED IN THIS DOCUMENT, ALL TRAFFIC IMPACT ANALYSES SUBMITTED TO THE TOWN OF LEESBURG SHALL COMPLY WITH THE PROVISIONS OF SECTION 7-111, PREPARATION OF TRAFFIC STUDIES, OF THE DESIGN AND CONSTRUCTION STANDARDS MANUAL (DCSM).

AGREED

APPLICANT OR ITS REPRESENTATIVE SIGNATURE

DATE

PRINT NAME

03/26/2015
revised 4/21/2015

COMPANY

DATE

TOWN REPRESENTATIVE SIGNATURE

DATE

PRINT NAME

See Email
acceptance
on ~~4/1/2015~~
3/30/2015

TOWN REPRESENTATIVE SIGNATURE

DATE

PRINT NAME

Adam Welschenbach

From: Calvin Grow <CGrow@LEESBURGVA.GOV>
Sent: Monday, March 30, 2015 4:15 PM
To: Adam Welschenbach
Cc: Anne Geiger
Subject: RE: Scoping Agreement for Sycolin Road Project

OK , but it was the feds that asked for it on S. King Street not VDOT

From: Adam Welschenbach [<mailto:awelschenbach@rdacivil.com>]
Sent: Monday, March 30, 2015 4:02 PM
To: Anne Geiger
Cc: Mark Gunn; Sohaib Qadir; Calvin Grow; Christopher Reed
Subject: Scoping Agreement for Sycolin Road Project

Anne-

Please find attached, the revised documents showing Rte. 643, not Town Rte. 4201, as requested.

If Calvin is in agreement, I would like to consider proposing this scoping document to VDOT as-is, rather than offering up to do a warrant study for an existing signal that is already in place. Typically, if there is an existing signal, VDOT will not require a warrant study, just a comparative capacity/LOS analysis.

If VDOT wishes/demands for us to do one, we can certainly add it to the final scoping documents.

Should you need anything else, please let us know.
Thanks,
Adam

Adam D. Welschenbach, PE , PTOE
Transportation Department, Project Manager

Rinker Design Associates, P.C.
9385 Discovery Boulevard, Suite 200
Manassas, VA 20109

Phone: ☎ 703.368.7373 (Manassas Office)
Phone: ☎ 703.334.9300 (Direct)

1

Fax: 703-257-5443 (Manassas Office, Suite 200)
Core Work Hours: M-F 8:30am to 5:30pm @ 38°45'N, 77°31'W

Email: awelschenbach@rdacivil.com
Rinker Design Associates, P.C. company website: www.rdacivil.com

 Please consider the environment before printing this e-mail.

This communication, together with any attachments hereto or links contained herein, is for the sole use of the intended recipient(s) and may contain information that is confidential or legally protected. If you are not the intended recipient, you are hereby notified that any review, disclosure, copying, dissemination, distribution or use of this communication is STRICTLY PROHIBITED. If you have received this communication in error, please notify the sender immediately by return e-mail message and delete the original and all copies of the communication, along with any attachments hereto or links herein, from your system.

From: Anne Geiger [<mailto:AGeiger@LEESBURGVA.GOV>]
Sent: Monday, March 30, 2015 3:18 PM
To: Christopher Reed
Cc: Mark Gunn; Adam Welschenbach; Sohaib Qadir; Calvin Grow
Subject: RE: Scoping Agreement for Sycolin Road Project

Chris,

Other than changing the route number to 643, Calvin believes that VDOT will require that we relook at the warrants for the Tavistock Road intersection. Everything else is fine.

Regards,

Anne Geiger

From: Christopher Reed [<mailto:creed@rdacivil.com>]
Sent: Sunday, March 29, 2015 10:41 AM
To: Anne Geiger
Cc: Mark Gunn; Adam Welschenbach; Sohaib Qadir
Subject: FW: Scoping Agreement for Sycolin Road Project

Anne,

Can you pass this on to Calvin for his review and comment /concurrence?

Thanks,

Chris

2

From: Adam Welschenbach
Sent: Thursday, March 26, 2015 1:45 PM
To: Christopher Reed
Cc: Mark Gunn; Sohaib Qadir
Subject: Scoping Agreement for Sycolin Road Project

Chris-

Please have Anne run this by Calvin Grow with the Town, prior to getting a scoping meeting with VDOT TE. We want to be sure the Town is in agreement with the scope of traffic study to be conducted for the project prior to inviting TE to comment.

If Calvin wishes to meet to discuss, I can be made available.

Thanks,
Adam

Adam D. Welschenbach, PE , PTOE
Transportation Department, Project Manager

Rinker Design Associates, P.C.
9385 Discovery Boulevard, Suite 200
Manassas, VA 20109

Phone: ☎ 703.368.7373 (Manassas Office)
Phone: ☎ 703.334.9300 (Direct)
Fax: 703-257-5443 (Manassas Office, Suite 200)
Core Work Hours: M-F 8:30am to 5:30pm @ 38°45'N, 77°31'W

Email: awelschenbach@rdacivil.com
Rinker Design Associates, P.C. company website: www.rdacivil.com

 Please consider the environment before printing this e-mail.

This communication, together with any attachments hereto or links contained herein, is for the sole use of the intended recipient(s) and may contain information that is confidential or legally protected. If you are not the intended recipient, you are hereby notified that any review, disclosure, copying, dissemination, distribution or use of this communication is STRICTLY PROHIBITED. If you have received this communication in error, please notify the sender immediately by return e-mail message and delete the original and all copies of the communication, along with any attachments hereto or links herein, from your system.

Appendix C: Level of Service Descriptions

All capacity analyses are based on the procedures specified by the Transportation Research Board Special Report: *Highway Capacity Manual (HCM)*, Levels of services (LOS) range from A to F. A brief description of level of service for signalized intersections is provided below.

Signalized Intersections: Level of service is based on the traffic volumes present in each lane on the roadway, the capacity of each lane at the intersection and the delay associated with each directional movement. The levels of service for signalized intersections are defined below:

Level of Service A: Describes operations with very low average delay per vehicle, i.e. equal to or less than 10 seconds. This occurs when the progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop, and short cycle lengths may also contribute to low delay.

Level of Service B: Describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing a higher levels of average delay.

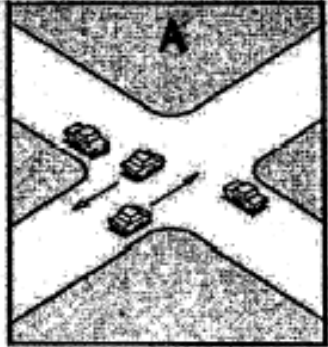
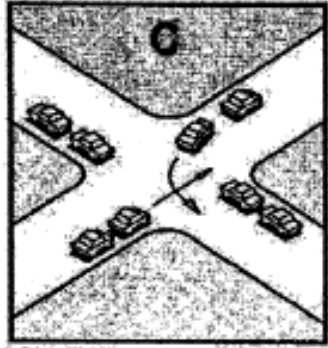
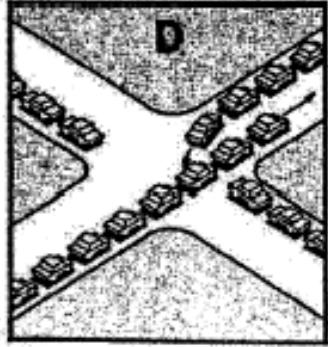
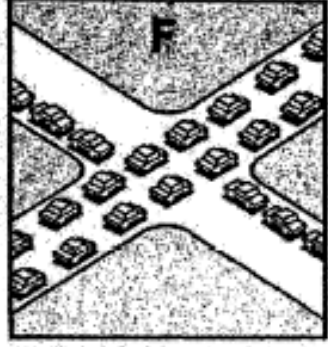
Level of Service C: Describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from moderate progression and/ or longer cycle lengths. The number of vehicles stopping is significant, however many may pass through the intersection during the first cycle phase. This is generally considered the lower end of the range of the acceptable level of service in rural areas.

Level of Service D: Describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from: unfavorable progression, long cycle lengths, and/or high volumes compared to physical capacity of the roadway. Many vehicles are required to stop, and many do not pass through the intersection during the first cycle phase. This is generally considered the lower end of the range of the acceptable level of service in urban areas.

Level of Service E: Describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delays generally indicate poor progression, long cycle lengths, and high traffic volumes.

Level of Service F: Describes operations with delay in the range of 81.0 (+) seconds per vehicle. This is considered to be unacceptable by most drivers. This condition often occurs with over-saturation (when traffic arrives at a flow rate that exceeds the capacity of the intersection).

See Figure C-1 showing graphical explanation of the levels of service descriptions.

<u>LOS</u>	<u>Roadway Segments or Controlled Access Highways</u>	<u>Intersections</u>	
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 - A material published in Highway Capacity Manual, National Academy of Sciences, 1965.

Figure C-1: Level of Service Definitions

The level of service criteria are given in Table 17-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. . . .

Table 17-2. Level of Service Criteria for TWSC Intersections

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. To remain consistent with the AWSC intersection analysis procedure described later in this chapter, a total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The proposed level of service criteria for TWSC intersections are somewhat different from the criteria used in Chapter 16 for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. . . .

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 2000. Transportation Research Board, National Research Council

Appendix D: Synchro™ Reports for Existing Year (2015)

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Volume (veh/h)	17	22	184	29	218	746
Sign Control	Stop	Stop	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	18	23	190	30	225	769
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						1238
Upstream signal (ft)						
pX, platoon unblocked	0.58					
vC, conflicting volume	1408	190			220	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1343	190			220	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	70	97			83	
cM capacity (veh/h)	59	822			1344	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	40	190	30	225	769	
Volume Left	18	0	0	225	0	
Volume Right	23	0	30	0	0	
cSH	123	1700	1700	1344	1700	
Volume to Capacity	0.33	0.11	0.02	0.17	0.45	
Queue Length 95th (ft)	32	0	0	15	0	
Control Delay (s)	47.9	0.0	0.0	8.2	0.0	
Lane LOS	E			A		
Approach Delay (s)	47.9	0.0		1.9		
Approach LOS	E					
Intersection Summary						
Average Delay	3.0					
Intersection Capacity Utilization	49.3%					ICU Level of Service A
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗
Volume (vph)	36	71	181	26	139	931
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	1.00	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	1743	1442	1570	1845
Fit Permitted	0.95	1.00	1.00	1.00	0.47	1.00
Satd. Flow (perm)	1121	1062	1743	1442	784	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	37	72	185	27	142	950
RTOR Reduction (vph)	0	46	0	19	0	0
Lane Group Flow (vph)	37	26	185	8	142	950
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		6
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	409	817
v/s Ratio Prot	c0.03		0.11		0.03	c0.52
v/s Ratio Perm		0.02		0.01	0.13	
v/c Ratio	0.09	0.07	0.38	0.02	0.35	1.16
Uniform Delay, d1	18.6	18.4	26.0	23.4	15.8	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3	0.5	0.0	0.5	86.6
Delay (s)	19.0	18.8	26.5	23.4	16.3	111.6
Level of Service	B	B	C	C	B	F
Approach Delay (s)	18.9		26.1		99.2	
Approach LOS	B		C		F	
Intersection Summary						
HCM 2000 Control Delay	82.1					HCM 2000 Level of Service F
HCM 2000 Volume to Capacity ratio	0.75					
Actuated Cycle Length (s)	90.0					Sum of lost time (s) 24.5
Intersection Capacity Utilization	69.0%					ICU Level of Service C
Analysis Period (min)	15					
c Critical Lane Group						

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Entr #1

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↖	↗	↖	↖	↗	↖	↖	↗	↖
Volume (veh/h)	1	0	1	13	1	15	5	236	7	40	1007	19
Sign Control	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	0	1	13	1	15	5	243	7	41	1038	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	1390	1381	1038	1375	1394	243	1058			251		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1385	1376	1038	1369	1389	185	1058			193		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	99	100	100	87	99	98	99			97		
cM capacity (veh/h)	109	133	280	103	131	762	658			1303		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	2	30	248	7	1079	20						
Volume Left	1	13	5	0	41	0						
Volume Right	1	15	0	7	0	20						
cSH	157	189	658	1700	1303	1700						
Volume to Capacity	0.01	0.16	0.01	0.00	0.03	0.01						
Queue Length 95th (ft)	1	14	1	0	2	0						
Control Delay (s)	28.2	27.6	0.3	0.0	0.9	0.0						
Lane LOS	D	D	A		A							
Approach Delay (s)	28.2	27.6	0.3		0.9							
Approach LOS	D	D										
Intersection Summary												
Average Delay	1.4											
Intersection Capacity Utilization	81.2%											ICU Level of Service D
Analysis Period (min)	15											

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Volume (veh/h)	6	251	46	212	853	20
Sign Control	Stop	Stop	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	6	264	48	223	898	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						802
Upstream signal (ft)						
pX, platoon unblocked	0.57	0.57	0.57			
vC, conflicting volume	1218	898	919			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1009	452	489			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	95	24	91			
cM capacity (veh/h)	131	348	562			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	6	264	272	898	21	
Volume Left	6	0	48	0	0	
Volume Right	0	264	0	0	21	
cSH	131	348	562	1700	1700	
Volume to Capacity	0.05	0.76	0.09	0.53	0.01	
Queue Length 95th (ft)	4	150	7	0	0	
Control Delay (s)	33.8	41.7	3.1	0.0	0.0	
Lane LOS	D	E	A			
Approach Delay (s)	41.5		3.1	0.0		
Approach LOS	E					
Intersection Summary						
Average Delay	8.3					
Intersection Capacity Utilization	67.1%					ICU Level of Service C
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	11	1	8	86	1	16	13	183	20	3	774	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	0.96	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.85
Satd. Flow (prot)	1781	1482		1693	1583	1687	1624	1468	1504	1845	1568	
Fit Permitted	0.84	1.00		0.73	1.00	0.09	1.00	1.00	0.63	1.00	1.00	
Satd. Flow (perm)	1556	1482		1298	1583	162	1624	1468	996	1845	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	11	1	8	90	1	17	14	191	21	3	806	71
RTOR Reduction (vph)	0	0	0	0	0	12	0	0	12	0	0	40
Lane Group Flow (vph)	0	12	2	0	91	5	14	191	9	3	806	31
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Effective Green, g (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Actuated g/C Ratio	0.30	0.30		0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44	0.44
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	462	440		385	470	236	712	644	584	809	688	
v/s Ratio Prot						c0.01	0.12		0.00	c0.44		
v/s Ratio Perm	0.01	0.00		c0.07	0.00	0.03		0.01	0.00		0.02	
v/c Ratio	0.03	0.01		0.24	0.01	0.06	0.27	0.01	0.01	1.00	0.05	
Uniform Delay, d1	24.9	24.8		26.6	24.8	18.6	17.8	15.8	10.7	28.0	16.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		1.4	0.0	0.1	0.2	0.0	0.0	30.5	0.0	
Delay (s)	25.0	24.8		28.0	24.8	18.7	18.0	15.8	10.7	58.5	16.1	
Level of Service	C	C		C	C	B	B	B	B	E	B	
Approach Delay (s)	24.9			27.5			17.9			54.9		
Approach LOS	C			C			B			D		

Intersection Summary			
HCM 2000 Control Delay	45.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group
Rinker Design Associates, P.C. Synchro 8 Report Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
6: Sycolin Rd & Utility Facility Entr.

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	210	1	20	833
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	223	1	21	886
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None		None		
Median storage (veh)						
Upstream signal (ft)			669			956
pX, platoon unblocked	0.71	0.95			0.95	
vC, conflicting volume	1152	223			224	
vC1, stage 1 conf vol					6	
vC2, stage 2 conf vol						
vCU, unblocked vol	858	161			162	
IC, single (s)	6.8	6.8			4.2	
IC, 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	99	100			98	
cM capacity (veh/h)	196	718			1300	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	1	1	223	1	907
Volume Left	1	0	0	0	21
Volume Right	0	1	0	1	0
cSH	196	718	1700	1700	1300
Volume to Capacity	0.01	0.00	0.13	0.00	0.02
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	23.5	10.0	0.0	0.0	0.4
Lane LOS	C	B			A
Approach Delay (s)	16.8		0.0		0.4
Approach LOS	C				C

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

Rinker Design Associates, P.C. Synchro 8 Report Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
7: Sycolin Rd & Tolbert Ln/ Tolbert Ln

2015 Existing Year
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	2	2	32	33	1	1	6	198	5	26	812	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Fit Protected	1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00		
Satd. Flow (prot)	1471	1583		1776	1583	1543	2890		1770	3462		
Fit Permitted	0.94	1.00		0.79	1.00	0.16	1.00		0.62	1.00		
Satd. Flow (perm)	1422	1583		1478	1583	257	2890		1154	3462		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96		0.96	0.96		0.96
Adj. Flow (vph)	2	2	33	34	1	1	6	206	5	27	846	3
RTOR Reduction (vph)	0	0	24	0	0	1	0	1	0	0	0	0
Lane Group Flow (vph)	0	4	9	0	35	0	6	210	0	27	849	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	29.5	29.5		29.5	29.5	57.9	33.9		57.9	33.9		33.9
Effective Green, g (s)	29.5	29.5		29.5	29.5	57.9	33.9		57.9	33.9		33.9
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.55	0.32		0.55	0.32		0.32
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		5.6
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	400	446		416	446	436	935		779	1120		
v/s Ratio Prot						0.00	0.07		c0.01	c0.25		
v/s Ratio Perm	0.00	0.01		c0.02	0.00	0.00			0.01			
v/c Ratio	0.01	0.02		0.08	0.00	0.01	0.22		0.03	0.76		
Uniform Delay, d1	27.1	27.2		27.7	27.0	12.0	25.8		10.6	31.7		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		1.00
Incremental Delay, d2	0.0	0.1		0.4	0.0	0.0	0.1		0.0	3.0		
Delay (s)	27.1	27.3		28.1	27.0	12.0	25.9		10.6	34.7		
Level of Service	C	C		C	C	B	C		B	C		
Approach Delay (s)	27.2			28.0			25.6			34.0		
Approach LOS	C			C			C			C		

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	104.7	Sum of lost time (s)	17.3
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group
Rinker Design Associates, P.C. Synchro 8 Report Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2015 Existing Year
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	20	168	874	65	179	428
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	21	173	901	67	185	441
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)					1238	
pX, platoon unblocked	0.82					
vC, conflicting volume	1711	901			968	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1757	901			968	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	46	46			74	
cM capacity (veh/h)	38	320			708	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	194	901	67	185	441	
Volume Left	21	0	0	185	0	
Volume Right	173	0	67	0	0	
cSH	180	1700	1700	708	1700	
Volume to Capacity	1.08	0.53	0.04	0.26	0.26	
Queue Length 95th (ft)	237	0	0	26	0	
Control Delay (s)	143.1	0.0	0.0	11.9	0.0	
Lane LOS	F			B		
Approach Delay (s)	143.1	0.0		3.5		
Approach LOS	F					
Intersection Summary						
Average Delay	16.7					
Intersection Capacity Utilization	77.4%					ICU Level of Service D
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2015 Existing Year
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	40	141	1008	29	83	559
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	1.00	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	1743	1442	1570	1845
Fit Permitted	0.95	1.00	1.00	1.00	0.12	1.00
Satd. Flow (perm)	1121	1062	1743	1442	201	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	41	144	1029	30	85	570
RTOR Reduction (vph)	0	91	0	13	0	0
Lane Group Flow (vph)	41	53	1029	17	85	570
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	197	817
v/s Ratio Prot	0.04		c0.59		0.03	c0.31
v/s Ratio Perm		c0.05		0.01	0.16	
v/c Ratio	0.10	0.14	2.10	0.04	0.43	0.70
Uniform Delay, d1	18.7	18.9	32.4	23.5	19.6	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.7	503.9	0.0	1.5	2.6
Delay (s)	19.2	19.7	536.2	23.6	21.1	22.8
Level of Service	B	B	F	C	C	C
Approach Delay (s)	19.5		521.7		22.6	
Approach LOS	B		F		C	
Intersection Summary						
HCM 2000 Control Delay	300.6					HCM 2000 Level of Service F
HCM 2000 Volume to Capacity ratio	1.02					
Actuated Cycle Length (s)	90.0					Sum of lost time (s) 24.5
Intersection Capacity Utilization	85.1%					ICU Level of Service E
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2015 Existing Year
Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	9	0	7	3	1	7	6	1135	3	4	611	5
Sign Control	Stop			Stop				Free			Free	
Grade	0%			0%				0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	9	0	7	3	1	7	6	1170	3	4	630	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)									942			
Upstream signal (ft)												
pX, platoon unblocked	0.74	0.74		0.74	0.74	0.74				0.74		
vC, conflicting volume	1828	1824	630	1828	1826	1170	635			1173		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1945	1938	630	1944	1941	1053	635			1058		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	72	100	99	90	98	99	99			99		
cM capacity (veh/h)	34	48	482	31	47	182	948			478		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	16	11	1176	3	634	5						
Volume Left	9	3	6	0	4	0						
Volume Right	7	7	0	3	0	5						
cSH	57	70	948	1700	478	1700						
Volume to Capacity	0.29	0.16	0.01	0.00	0.01	0.00						
Queue Length 95th (ft)	26	13	0	0	1	0						
Control Delay (s)	92.5	66.0	0.2	0.0	0.3	0.0						
Lane LOS	F	F	A		A							
Approach Delay (s)	92.5	66.0	0.2		0.3							
Approach LOS	F	F										
Intersection Summary												
Average Delay	1.5											
Intersection Capacity Utilization	76.7%											ICU Level of Service D
Analysis Period (min)	15											

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2015 Existing Year
Timing Plan: PM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	19	170	195	993	485	36
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	20	179	205	1045	511	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					802	
pX, platoon unblocked	0.82	0.82	0.82			
vC, conflicting volume	1966	511	548			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2066	298	344			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	42	71	78			
cM capacity (veh/h)	35	608	915			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	20	179	1251	511	38	
Volume Left	20	0	205	0	0	
Volume Right	0	179	0	0	38	
cSH	35	608	915	1700	1700	
Volume to Capacity	0.58	0.29	0.22	0.30	0.02	
Queue Length 95th (ft)	49	31	21	0	0	
Control Delay (s)	203.7	13.4	6.6	0.0	0.0	
Lane LOS	F	B	A			
Approach Delay (s)	32.5		6.6	0.0		
Approach LOS	D					
Intersection Summary						
Average Delay	7.3					
Intersection Capacity Utilization	101.9%					ICU Level of Service G
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr

2015 Existing Year
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	59	5	22	49	1	9	5	888	94	18	435	13	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	1780	1482		1694	1583	1687	1624	1468	1504	1845	1568		
Fit Permitted	0.74	1.00		0.73	1.00	0.36	1.00	1.00	0.09	1.00	1.00		
Satd. Flow (perm)	1380	1482		1305	1583	631	1624	1468	144	1845	1568		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96		
Adj. Flow (vph)	61	5	23	51	1	9	5	925	98	19	453	14	
RTOR Reduction (vph)	0	0	16	0	0	6	0	0	46	0	0	8	
Lane Group Flow (vph)	0	66	7	0	52	3	5	925	52	19	453	6	
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	4			8		8	5	2		1	6		
Permitted Phases	4		4	8		8	2		2	6	6		
Actuated Green, G (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9		
Effective Green, g (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9		
Actuated g/C Ratio	0.30	0.30		0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44		
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	409	440		387	470	442	712	644	210	809	688		
v/s Ratio Prot						0.00	c0.57		c0.01	0.25			
v/s Ratio Perm	c0.05	0.00		0.04	0.00	0.00		0.04	0.04		0.00		
v/c Ratio	0.16	0.02		0.13	0.01	0.01	1.30	0.08	0.09	0.56	0.01		
Uniform Delay, d1	26.0	24.8		25.7	24.8	11.6	28.1	16.3	18.9	20.9	15.8		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.8	0.1		0.7	0.0	0.0	144.8	0.1	0.2	0.8	0.0		
Delay (s)	26.8	24.9		26.5	24.8	11.6	172.9	16.4	19.1	21.7	15.8		
Level of Service	C	C		C	C	B	F	B	B	C	B		
Approach Delay (s)	26.3			26.2			157.2			21.4			
Approach LOS	C			C			F			C			
Intersection Summary													
HCM 2000 Control Delay	105.7					HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio	0.75												
Actuated Cycle Length (s)	100.0					Sum of lost time (s)			16.6				
Intersection Capacity Utilization	69.0%					ICU Level of Service			C				
Analysis Period (min)	15												

Rinker Design Associates, P.C.

Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.

2015 Existing Year
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	958	1	1	468
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	1019	1	1	498
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None		None		
Median storage (veh)						
Upstream signal (ft)			669			956
pX, platoon unblocked	0.66	0.58			0.58	
vC, conflicting volume	1519	1019			1020	
vC1, stage 1 conf vol						6
vC2, stage 2 conf vol						
vCu, unblocked vol	970	674			676	
IC, single (s)	6.8	6.8			4.2	
IC, 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	99	100			100	
cM capacity (veh/h)	159	214			509	
Direction, Lane #						
	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	1	1	1019	1	499	
Volume Left	1	0	0	0	1	
Volume Right	0	1	0	1	0	
cSH	159	214	1700	1700	509	
Volume to Capacity	0.01	0.00	0.60	0.00	0.00	
Queue Length 95th (ft)	1	0	0	0	0	
Control Delay (s)	27.8	21.9	0.0	0.0	0.1	
Lane LOS	D	C			A	
Approach Delay (s)	24.8		0.0		0.1	
Approach LOS	C				C	
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	60.4%			ICU Level of Service		
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln

2015 Existing Year
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	
Volume (vph)	7	1	21	1	7	6	11	935	1	1	442	7	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	6.1		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95		
Fit Protected	1.00	0.85		1.00	0.85	1.00	1.00	1.00	0.85	1.00	1.00		
Fit Permitted	0.96	1.00		0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	1264	1583		1851	1583	1543	2888	1770	3432				
Fit Permitted	0.88	1.00		0.99	1.00	0.42	1.00	1.00	0.13	1.00			
Satd. Flow (perm)	1163	1583		1839	1583	675	2888		234	3432			
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96		
Adj. Flow (vph)	7	1	22	1	7	6	11	974	1	1	460	7	
RTOR Reduction (vph)	0	0	16	0	0	4	0	0	0	0	1	0	
Lane Group Flow (vph)	0	8	6	0	8	2	11	975	0	1	466	0	
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases	4			8		8	5	2		1	6		
Permitted Phases	4		4	8		8	2		2	6	6		
Actuated Green, G (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4			
Effective Green, g (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4			
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.58	0.36		0.58	0.36			
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6			
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	310	423		491	423	577	1034		468	1229			
v/s Ratio Prot						c0.00	c0.34		0.00	0.14			
v/s Ratio Perm	c0.01	0.00		0.00	0.00	0.01			0.00				
v/c Ratio	0.03	0.01		0.02	0.00	0.02	0.94		0.00	0.38			
Uniform Delay, d1	29.7	29.6		29.7	29.6	10.1	34.2		12.2	26.2			
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.2	0.1		0.1	0.0	0.0	16.0		0.0	0.2			
Delay (s)	29.9	29.7		29.7	29.6	10.1	50.2		12.2	26.4			
Level of Service	C	C		C	C	B	D		B	C			
Approach Delay (s)	29.7			29.7			49.8			26.4			
Approach LOS	C			C			D			C			
Intersection Summary													
HCM 2000 Control Delay	41.9					HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio	0.41												
Actuated Cycle Length (s)	110.0					Sum of lost time (s)			17.3				
Intersection Capacity Utilization	48.2%					ICU Level of Service			A				
Analysis Period (min)	15												

Rinker Design Associates, P.C.

Synchro 8 Report
 Sycolin Road Phase IV Widening

Appendix E: Extracted Pages from Cornerstone Chapel (Church) Traffic Study
(For Full Study: Shall be requested to the Town of Leesburg)

CORNERSTONE CHAPEL
TRAFFIC IMPACT STUDY
LEESBURG, VIRGINIA

Prepared for:
Cornerstone Chapel

Prepared by:
Wells + Associates, Inc.

November 13, 2009



O:\PROJECTS\3501-4000\3798 CORNERSTONE CHAPEL\GRAPHICS\11.03.09\3798 RPT GRAPHICS 11.03.09.DWG

DAO

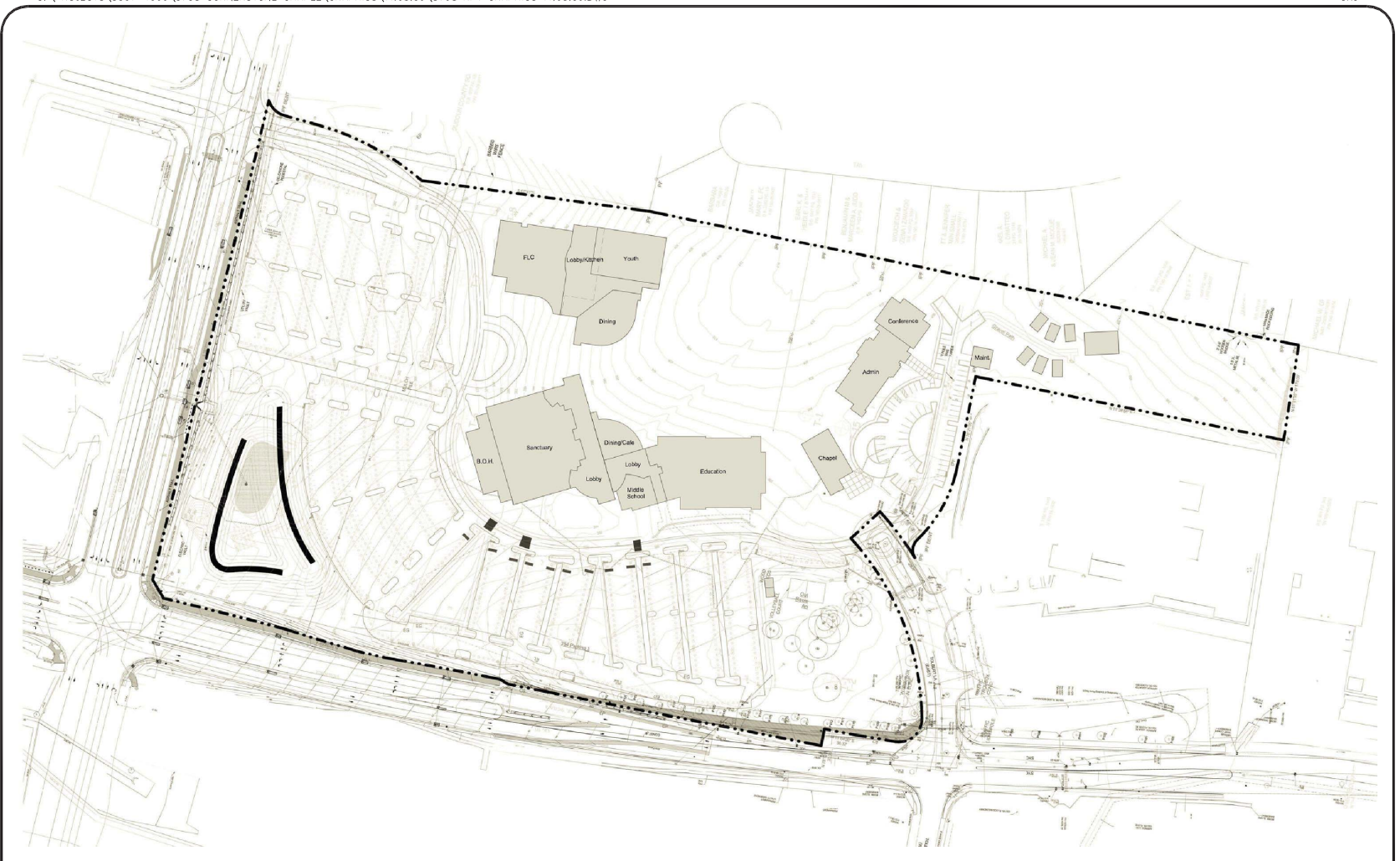


Figure 2
Site Plan Reduction

Plan Provided By:
H + H Architects



Cornerstone Chapel
Loudoun County, Virginia



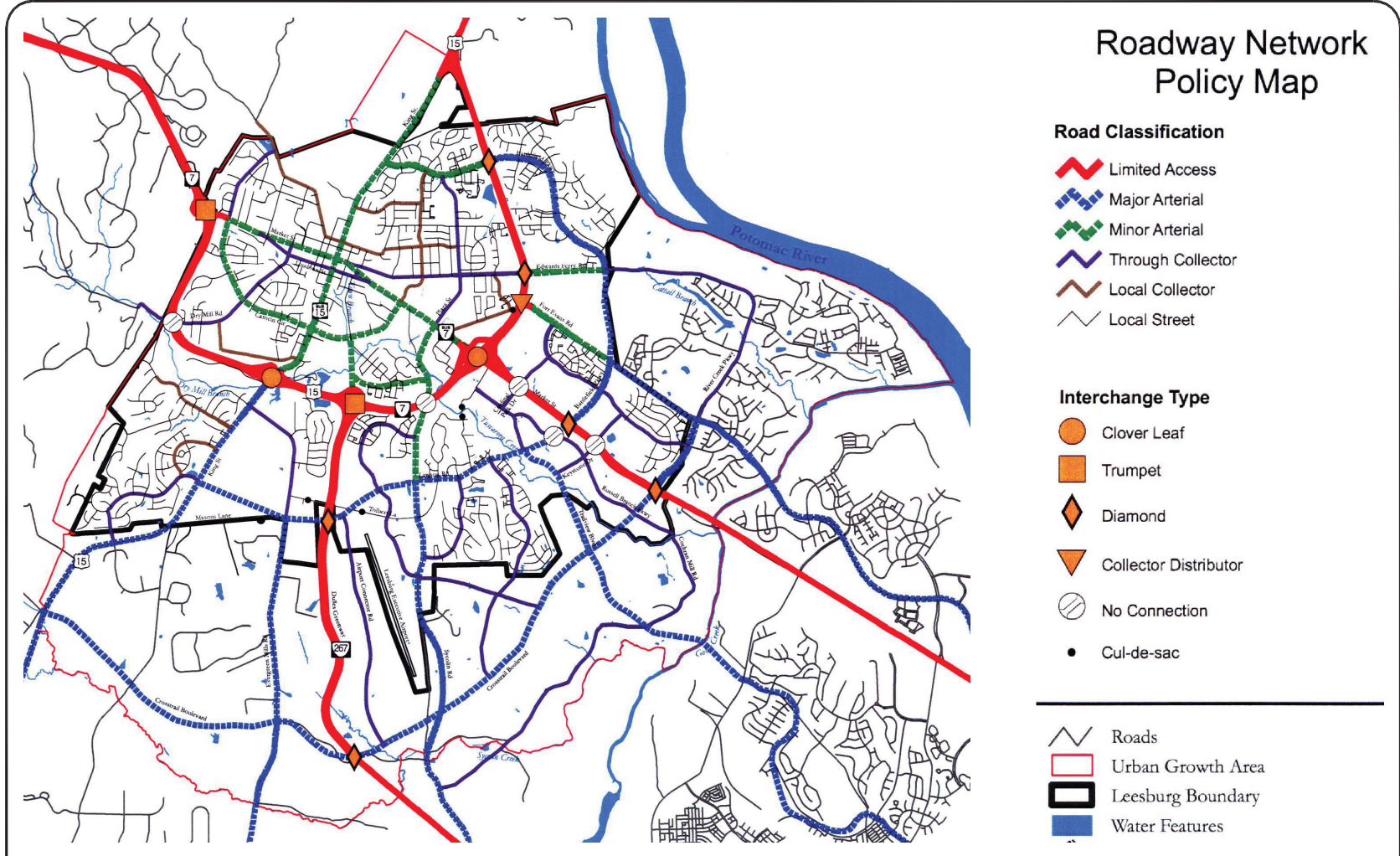


Figure 8
Leesburg Town Plan

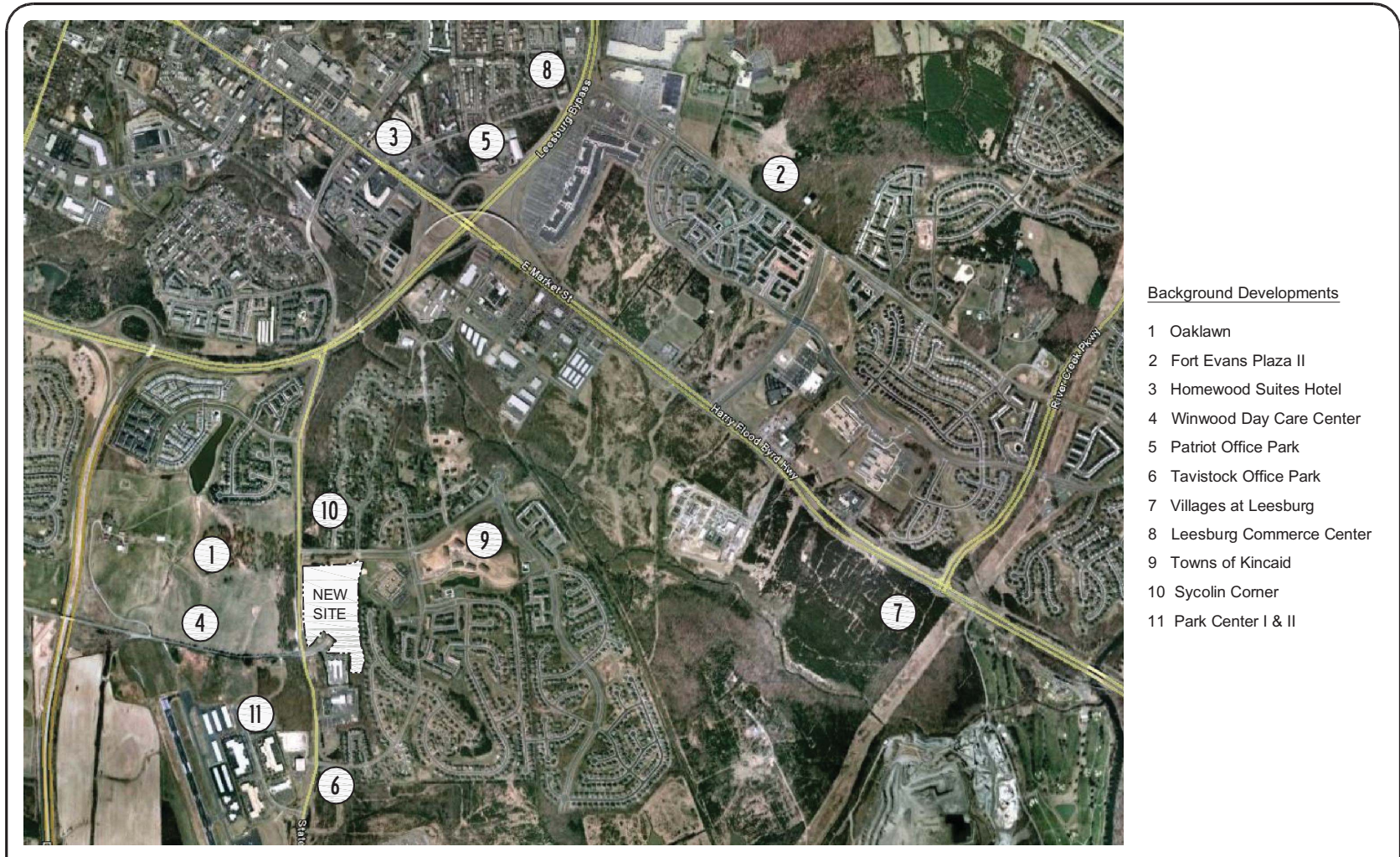


Figure 12
Background Development Location Map



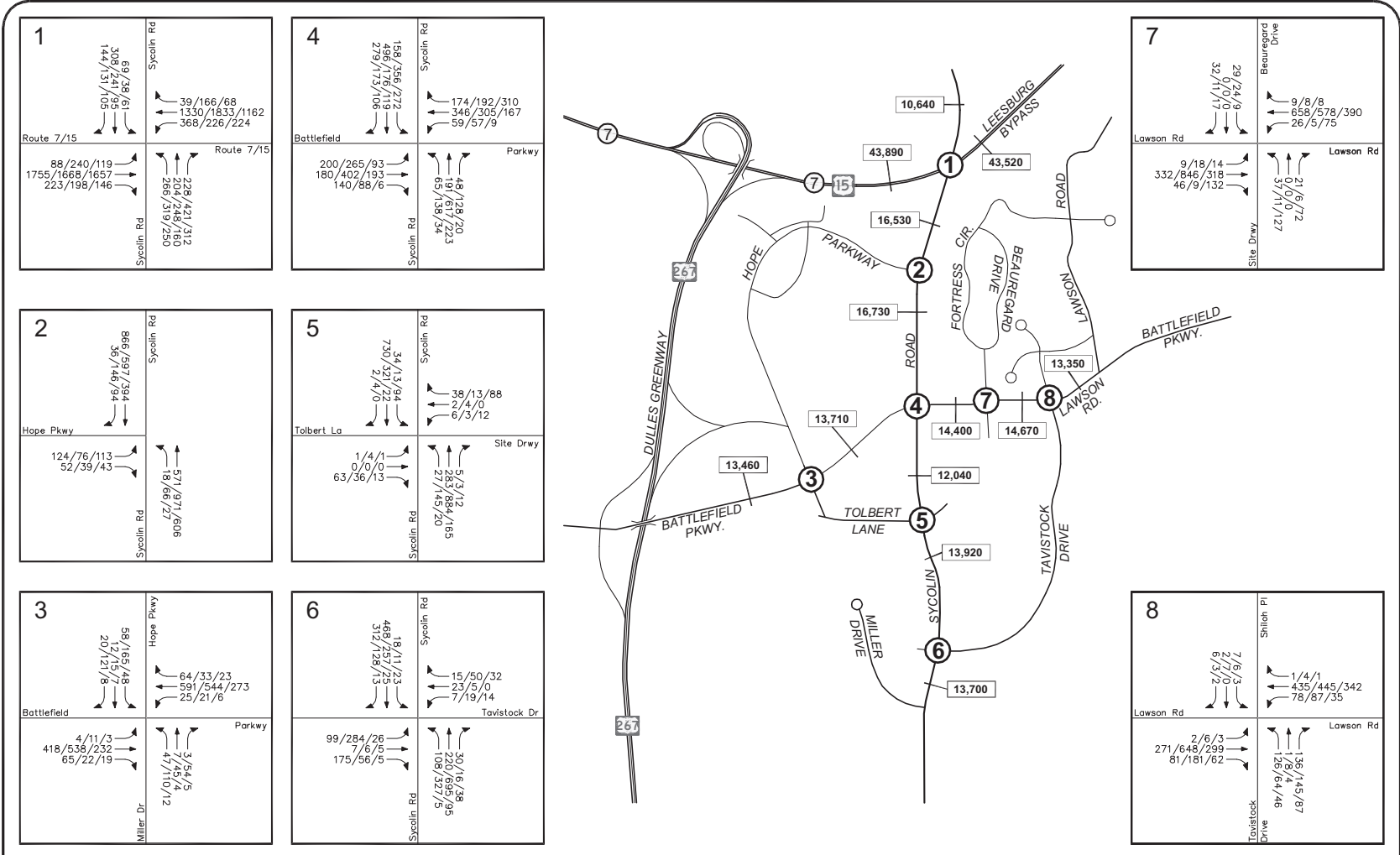


Figure 22
Total Future Peak Hour Traffic Forecasts (2011)

AM/PM/SUN Peak Hour Traffic Volume
XX,XXX Weekday Average Daily Trip (ADT)

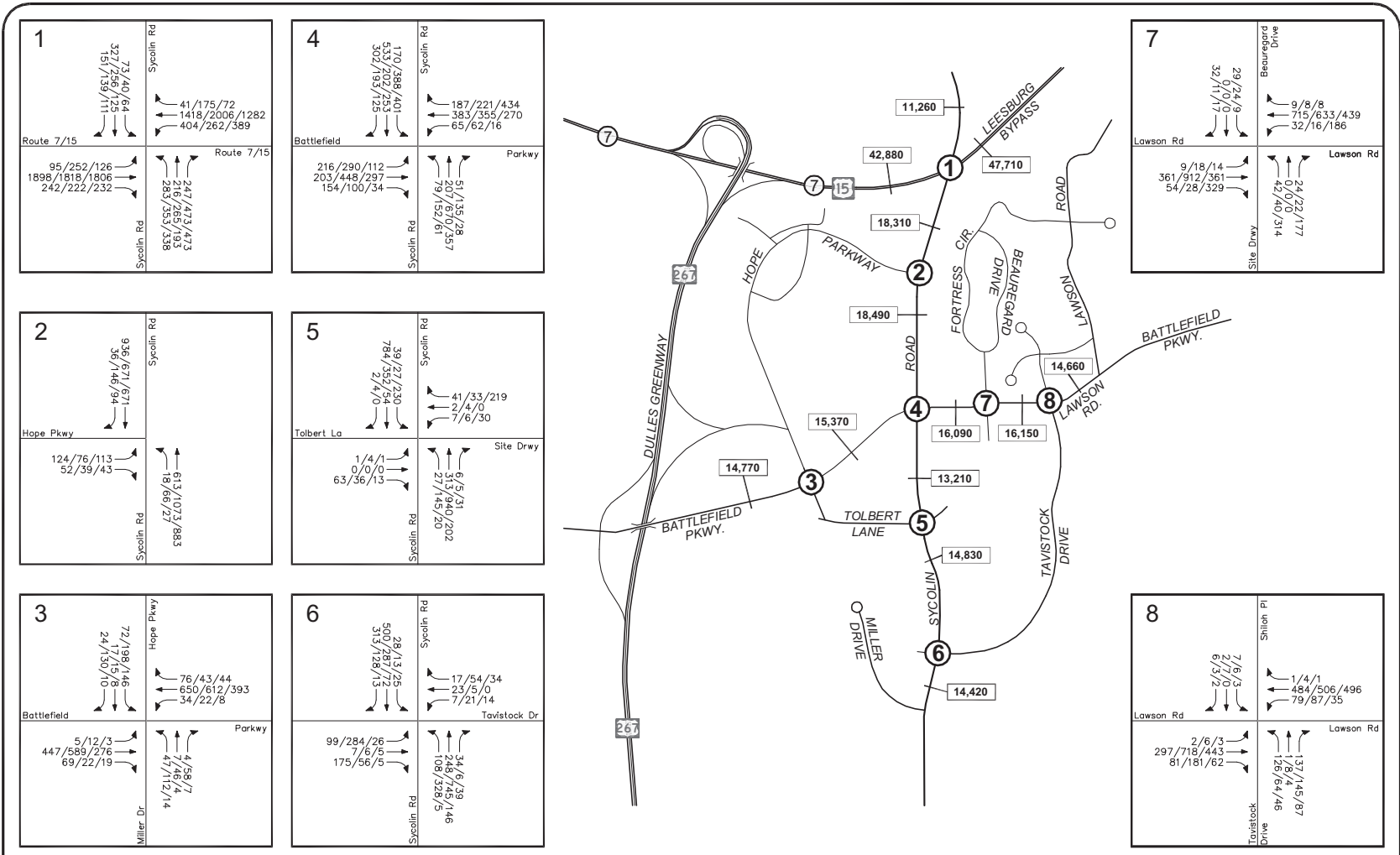


Figure 23
Total Future Peak Hour Traffic Forecasts (2016)

AM/PM/SUN Peak Hour Traffic Volume
XX,XXX Weekday Average Daily Trip (ADT)



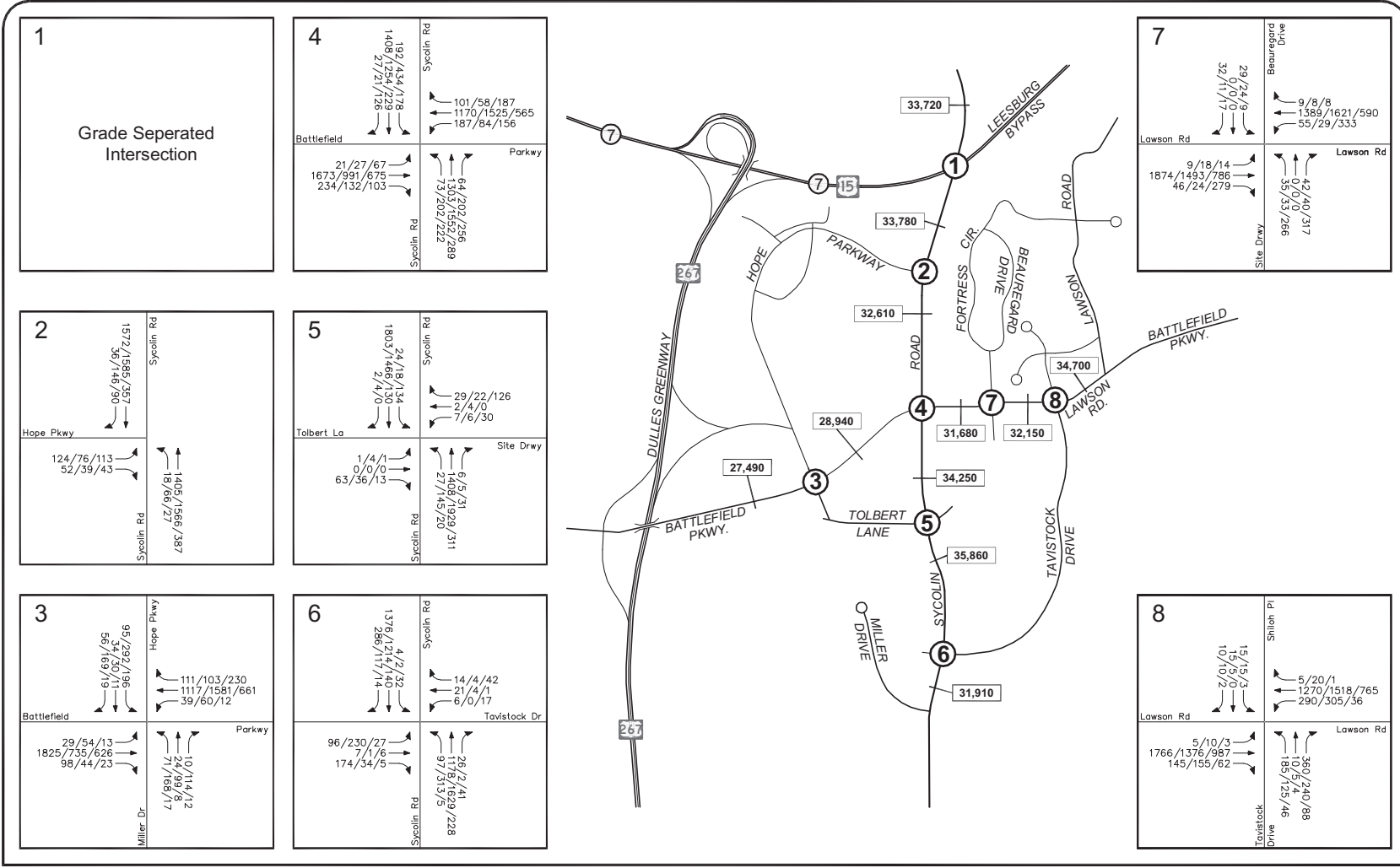


Figure 24
Total Future Peak Hour Traffic Forecasts (2036)

AM/PM/SUN Peak Hour Traffic Volume
XX,XXX Weekday Average Daily Trip (ADT)



Appendix F: Correspondence from the Town of Leesburg

Adam Welschenbach

From: Anne Geiger <AGeiger@LEESBURGVA.GOV>
Sent: Monday, August 31, 2015 4:17 PM
To: Fan, Xuejun (VDOT)
Cc: Susie Lue, VDOT; Adam Welschenbach; Calvin Grow; a.salahshoor@VirginiaDOT.org; Mark Gunn
Subject: UPC 102895 Sycolin Road Ph. IV - traffic study letters
Attachments: 2015-08-25 UPC102895-Median Break Ltr-VDOT.pdf; 2015-08-25 UPC102895-No Roundabouts Ltr to VDOT.pdf

Xuejun,

Attached are 2 letters from the Town of Leesburg that are needed as a part of the traffic study on the above noted project. The hard copies have been mailed to you.

If you have any questions about the information in the letters, please let me know. Thank you.

Thank you.

Regards,

Anne Geiger

Anne D. Geiger, P.E., Project Manager, Office of Capital Projects

Department of Public Works and Capital Projects
Town of Leesburg, Virginia
25 W. Market St., Leesburg, VA 20176-2901
703.771.2742 (office) 703.737.7065 (fax)
AGeiger@LeesburgVA.gov



RENÉE M. LaFOLLETTE, P.E., DIRECTOR
Department of Public Works and Capital Projects

25 West Market Street ■ 20176 ■ 703-771-2790 ■ Fax: 703-737-7065 ■ rlafollette@leesburgva.gov ■ www.leesburgva.gov

August 25, 2015

Mr. Xuejun Fan
VDOT Traffic Engineering
4975 Alliance Drive
Fairfax, Virginia 22030-6664

RE: UPC 102895: Sycolin Rd Widening Phase IV - Roundabouts on Project

Dear Mr. Fan:

The Town of Leesburg has considered constructing roundabouts for this project and, for the reasons noted below, has determined that they are not appropriate for the project. Please note that the Town of Leesburg maintains its own roads.

The project is the last phase of Sycolin Road Widening within the Town limits and consists of widening the road to 4 lanes with median between 500 feet south of Tolbert Lane and just north of Loudoun Center Place. Within that space, there are three (3) intersections with Sycolin Road where roundabouts could possibly be appropriate: Tavistock Lane, Miller Drive, and the commercial entrance to Leesburg Executive Airport/Loudoun Co. Warehouse.

In looking at this corridor, the following conditions exist:

- Tolbert Lane is already signalized.
- Tavistock Lane is already signalized.
- The traffic signal met the required warrants when it was installed in 2012.
- Safety was an issue at the intersection and still is an issue.
- The Town chooses to keep the signal.
- Miller Drive is an existing three-legged intersection.
 - The right-of-way cost to install a roundabout on the 4th leg of the intersection, on private property, is very expensive and a cost the Town does not want to incur.
- At the commercial entrance to the Leesburg Executive Airport and Loudoun County Warehouse, with the required sidewalk and shared use path for this project, there is physically not sufficient room for a 150 ft. to 220 ft. diameter roundabout.
 - On the Airport side, the roundabout would encroach into the existing parking lot of a privately leased building at the Airport.

UPC 102895: Sycolin Rd Widening Phase IV - Roundabouts on Project
August 25, 2015
Page 2

- o On the Loudoun County Warehouse side, there is a significant vertical drop off (eleven feet) to the parking lot that would preclude a roundabout on this side of the intersection.
- Loudoun Center Place in Loudoun County will be signalized by the end of the calendar year.

Based on this information, the Town of Leesburg will not be constructing roundabouts with this project.

Sincerely,



Anne D. Geiger, P.E.
Project Manager

Cc: Adam Welschenbach, Rinker Design Associates
Susie Lue, VDOT – NOVA Local Assistance
Calvin Grow, Town of Leesburg
Amir Salahshoor, VDOT – NOVA Local Assistance



RENÉE M. LaFOLLETTE, P.E., DIRECTOR
Department of Public Works and Capital Projects

25 West Market Street ■ 20176 ■ 703-771-2790 ■ Fax: 703-737-7065 ■ rlafollette@leesburgva.gov ■ www.leesburgva.gov

August 25, 2015

Mr. Xuejun Fan
VDOT Traffic Engineering
4975 Alliance Drive
Fairfax, Virginia 22030-6664

RE: UPC 102895: Sycolin Rd Widening Phase IV – Median Break at Station 143+44.26

Dear Mr. Fan:

The Town of Leesburg will be providing a median break at station 143+44.26 in front of 620 Sycolin Road with the above noted project. This median break is for Dominion VA Power's use. The property is a material storage yard for Dominion VA Power and the work vehicles need to be able to make both right and left turns from their property onto Sycolin Road with, among other materials, power poles.

Dominion VA Power has requested that this median break be constructed with the project and the Town has agreed to do so. Please note that the Town of Leesburg maintains its own roads.

Sincerely,



Anne D. Geiger, P.E.
Project Manager

Cc: Adam Welschenbach, Rinker Design Associates
Susie Lue, VDOT – NOVA Local Assistance
Calvin Grow, Town of Leesburg
Amir Salahshoor, VDOT – NOVA Local Assistance

Appendix G: Synchrono™ Report for Opening Year (2019)

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2019 Opening Year No Build
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	18	24	199	31	236	807
Sign Control	Stop		Free		Stop	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	19	25	205	32	243	832
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						1238
Upstream signal (ft)						
pX, platoon unblocked	0.57					
vC, conflicting volume	1524	205			237	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1541	205			237	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	55	97			82	
cM capacity (veh/h)	41	806			1324	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	43	205	32	243	832	
Volume Left	19	0	0	243	0	
Volume Right	25	0	32	0	0	
cSH	90	1700	1700	1324	1700	
Volume to Capacity	0.48	0.12	0.02	0.18	0.49	
Queue Length 95th (ft)	51	0	0	17	0	
Control Delay (s)	77.4	0.0	0.0	8.3	0.0	
Lane LOS	F			A		
Approach Delay (s)	77.4	0.0		1.9		
Approach LOS	F					
Intersection Summary						
Average Delay	4.0					
Intersection Capacity Utilization	52.5%					ICU Level of Service A
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2019 Opening Year No Build
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	39	77	196	28	150	1008
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	1.00	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	1743	1442	1570	1845
Fit Permitted	0.95	1.00	1.00	1.00	0.47	1.00
Satd. Flow (perm)	1121	1062	1743	1442	774	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	40	79	200	29	153	1029
RTOR Reduction (vph)	0	50	0	21	0	0
Lane Group Flow (vph)	40	29	200	8	153	1029
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	405	817
v/s Ratio Prot	c0.04		0.11		0.03	c0.56
v/s Ratio Perm		0.03		0.01	0.14	
v/c Ratio	0.10	0.07	0.41	0.02	0.38	1.26
Uniform Delay, d1	18.7	18.5	26.3	23.4	15.9	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.6	0.0	0.6	126.6
Delay (s)	19.1	18.9	26.8	23.4	16.5	151.7
Level of Service	B	B	C	C	B	F
Approach Delay (s)	19.0		26.4		134.2	
Approach LOS	B		C		F	
Intersection Summary						
HCM 2000 Control Delay	109.1					HCM 2000 Level of Service F
HCM 2000 Volume to Capacity ratio	0.82					
Actuated Cycle Length (s)	90.0					Sum of lost time (s) 24.5
Intersection Capacity Utilization	73.1%					ICU Level of Service D
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Entr #1

2019 Opening Year No Build
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1	13	1	15	5	255	7	41	1090	19
Sign Control	Stop			Stop				Free			Free	
Grade	0%			0%				0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	1	1	13	1	15	5	263	7	42	1124	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)								942				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	1497	1489	1124	1483	1501	263	1143			270		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1497	1488	1124	1482	1501	192	1143			199		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	99	99	100	84	99	98	99			97		
cM capacity (veh/h)	90	113	250	84	110	747	611			1281		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	3	30	268	7	1166	20						
Volume Left	1	13	5	0	42	0						
Volume Right	1	15	0	7	0	20						
cSH	125	158	611	1700	1281	1700						
Volume to Capacity	0.02	0.19	0.01	0.00	0.03	0.01						
Queue Length 95th (ft)	2	17	1	0	3	0						
Control Delay (s)	34.6	33.1	0.3	0.0	1.0	0.0						
Lane LOS	D	D	A		A							
Approach Delay (s)	34.6	33.1	0.3		1.0							
Approach LOS	D	D										
Intersection Summary												
Average Delay	1.6											
Intersection Capacity Utilization	86.7%											ICU Level of Service E
Analysis Period (min)	15											

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2019 Opening Year No Build
Timing Plan: AM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	6	272	50	229	923	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	6	286	53	241	972	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						802
Upstream signal (ft)						
pX, platoon unblocked	0.57	0.57	0.57			
vC, conflicting volume	1318	972	995			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1180	573	614			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	94	3	89			
cM capacity (veh/h)	100	295	499			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	6	286	294	972	23	
Volume Left	6	0	53	0	0	
Volume Right	0	286	0	0	23	
cSH	100	295	499	1700	1700	
Volume to Capacity	0.06	0.97	0.11	0.57	0.01	
Queue Length 95th (ft)	5	246	9	0	0	
Control Delay (s)	43.4	84.1	3.7	0.0	0.0	
Lane LOS	E	F	A			
Approach Delay (s)	83.3		3.7	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay	16.1					
Intersection Capacity Utilization	72.1%					ICU Level of Service C
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr

2019 Opening Year No Build
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	11	1	8	89	1	17	13	198	21	3	838	69
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	5.3	5.3	5.3	5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.96	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1781	1482	1693	1583	1687	1624	1468	1504	1845	1568	1568	1568
Fit Permitted	0.83	1.00	0.73	1.00	0.09	1.00	1.00	0.61	1.00	1.00	1.00	1.00
Satd. Flow (perm)	1554	1482	1295	1583	162	1624	1468	969	1845	1568	1568	1568
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	11	1	8	93	1	18	14	206	22	3	873	72
RTOR Reduction (vph)	0	0	6	0	0	13	0	0	12	0	0	40
Lane Group Flow (vph)	0	12	2	0	94	5	14	206	10	3	873	32
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4	8	8	8	2	2	6	6	6	6	6
Permitted Phases	4	4	8	8	8	2	2	6	6	6	6	6
Actuated Green, G (s)	29.7	29.7	29.7	29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Effective Green, g (s)	29.7	29.7	29.7	29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44	0.44
Clearance Time (s)	5.3	5.3	5.3	5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	461	440	384	470	236	712	644	572	809	688	688	688
v/s Ratio Prot	c0.01	0.13	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.47	0.02	0.02
v/c Ratio	0.03	0.01	0.24	0.01	0.06	0.29	0.01	0.01	0.01	1.08	0.05	0.05
Uniform Delay, d1	24.9	24.8	26.6	24.8	18.8	18.0	15.8	10.7	28.1	16.1	16.1	16.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	1.5	0.0	0.1	0.2	0.0	0.0	55.2	0.0	0.0	0.0
Delay (s)	25.0	24.8	28.2	24.8	18.9	18.3	15.8	10.8	83.2	16.1	16.1	16.1
Level of Service	C	C	C	C	B	B	B	B	F	B	B	B
Approach Delay (s)	24.9		27.6		18.1		77.9					
Approach LOS	C		C		B		E					

Intersection Summary

HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.

2019 Opening Year No Build
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	1	1	227	1	20	902
Volume (veh/h)	Stop	Free	Free	Free	Free	Free
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	241	1	21	960
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)			None		None	
Median type						
Median storage (veh)						
Upstream signal (ft)			669		956	
pX platoon unblocked	0.69	0.94			0.94	
vC conflicting volume	1244	241			243	
vC1 stage 1 conf vol					6	
vC2 stage 2 conf vol						
vCU unblocked vol	949	168			169	
IC single (s)	6.8	6.8			4.2	
IC 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	99	100			98	
cM capacity (veh/h)	168	704			1281	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	1	1	241	1	981
Volume Left	1	0	0	0	21
Volume Right	0	1	0	1	0
cSH	168	704	1700	1700	1281
Volume to Capacity	0.01	0.00	0.14	0.00	0.02
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	26.5	10.1	0.0	0.0	0.5
Lane LOS	D	B			A
Approach Delay (s)	18.3		0.0		0.5
Approach LOS	C				

Intersection Summary

Average Delay	0.4				
Intersection Capacity Utilization	73.5%	ICU Level of Service	D		
Analysis Period (min)	15				

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln

2019 Opening Year No Build
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	1	35	7	2	41	6	214	6	39	879	3
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	5.6	5.6	5.6	5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	5.6
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Lane Util. Factor	1.00	0.85	1.00	0.85	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00
Fit Protected	0.97	1.00	0.96	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1372	1583	1793	1583	1543	2891	1770	3463	1770	3463	1770	3463
Fit Permitted	0.93	1.00	0.89	1.00	0.13	1.00	0.61	1.00	0.61	1.00	0.61	1.00
Satd. Flow (perm)	1323	1583	1666	1583	219	2891	1134	3463	1134	3463	1134	3463
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	1	36	7	2	43	6	223	6	41	916	3
RTOR Reduction (vph)	0	0	26	0	0	31	0	2	0	0	0	0
Lane Group Flow (vph)	0	3	10	0	9	12	6	227	0	41	919	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4	4	8	8	2	2	6	6	6	6	6
Permitted Phases	4	4	4	8	8	2	2	6	6	6	6	6
Actuated Green, G (s)	29.5	29.5	29.5	29.5	29.5	59.9	36.0	59.9	36.0	59.9	36.0	36.0
Effective Green, g (s)	29.5	29.5	29.5	29.5	29.5	59.9	36.0	59.9	36.0	59.9	36.0	36.0
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.56	0.34	0.56	0.34	0.56	0.34	0.34
Clearance Time (s)	5.6	5.6	5.6	5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	5.6
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	365	437	460	437	419	975	779	1168	779	1168	779	1168
v/s Ratio Prot	0.00	0.01	0.01	0.01	0.01	0.00	0.08	0.00	0.02	0.02	0.02	0.02
v/c Ratio	0.01	0.02	0.02	0.03	0.01	0.23	0.05	0.05	0.79	0.05	0.79	0.79
Uniform Delay, d1	28.0	28.1	28.1	28.1	12.3	25.4	10.5	31.9	10.5	31.9	10.5	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.1	0.1	0.1	0.0	0.1	0.0	3.6	0.0	3.6	0.0	3.6
Delay (s)	28.0	28.2	28.2	28.2	12.3	25.5	10.5	35.5	10.5	35.5	10.5	35.5
Level of Service	C	C	C	C	B	C	B	D	B	D	B	D
Approach Delay (s)	28.2		28.2		25.2		34.4					
Approach LOS	C		C		C		C					

Intersection Summary

HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	106.7	Sum of lost time (s)	17.3
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2019 Opening Year No Build
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	22	182	946	70	194	463
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	23	188	975	72	200	477
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						1238
pX, platoon unblocked	0.79					
vC, conflicting volume	1853	975			1047	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1947	975			1047	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	12	35			70	
cM capacity (veh/h)	26	290			660	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	210	975	72	200	477	
Volume Left	23	0	0	200	0	
Volume Right	188	0	72	0	0	
cSH	137	1700	1700	660	1700	
Volume to Capacity	1.53	0.57	0.04	0.30	0.28	
Queue Length 95th (ft)	364	0	0	32	0	
Control Delay (s)	331.0	0.0	0.0	12.8	0.0	
Lane LOS	F			B		
Approach Delay (s)	331.0	0.0		3.8		
Approach LOS	F					
Intersection Summary						
Average Delay		37.3				
Intersection Capacity Utilization		83.0%		ICU Level of Service		E
Analysis Period (min)		15				

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2019 Opening Year No Build
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	43	153	1091	31	90	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	1.00	0.85	1.00	0.85	1.00	1.00
Satd. Flow (prot)	0.95	1.00	1.00	1.00	0.95	1.00
Fit Permitted	1.00	1.00	1.00	1.00	1.00	1.00
Satd. Flow (perm)	1121	1062	1743	1442	201	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	44	156	1113	32	92	617
RTOR Reduction (vph)	0	99	0	13	0	0
Lane Group Flow (vph)	44	57	1113	19	92	617
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	197	817
v/s Ratio Prot	0.04		c0.64		0.04	c0.33
v/s Ratio Perm		c0.05		0.01	0.17	
v/c Ratio	0.11	0.15	2.28	0.05	0.47	0.76
Uniform Delay, d1	18.7	19.0	32.4	23.6	19.7	21.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.8	580.7	0.0	1.7	4.0
Delay (s)	19.2	19.8	613.1	23.6	21.4	25.0
Level of Service	B	B	F	C	C	C
Approach Delay (s)	19.7		596.6		24.5	
Approach LOS	B		F		C	
Intersection Summary						
HCM 2000 Control Delay		343.0		HCM 2000 Level of Service		F
HCM 2000 Volume to Capacity ratio		1.10				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		24.5
Intersection Capacity Utilization		89.5%		ICU Level of Service		E
Analysis Period (min)		15				
c Critical Lane Group						

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2019 Opening Year No Build
Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	9	1	7	3	1	7	6	1229	3	4	661	5
Sign Control	Stop			Stop				Free			Free	
Grade	0%			0%				0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	9	1	7	3	1	7	6	1267	3	4	681	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)								942				
pX, platoon unblocked	0.74	0.74		0.74	0.74	0.74					0.74	
vC, conflicting volume	1977	1972	681	1977	1974	1267	687			1270		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2146	2139	681	2146	2142	1185	687			1189		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	61	97	98	86	97	95	99			99		
cM capacity (veh/h)	24	36	450	21	35	151	907			426		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	18	11	1273	3	686	5						
Volume Left	9	3	6	0	4	0						
Volume Right	7	7	0	3	0	5						
cSH	40	51	907	1700	426	1700						
Volume to Capacity	0.43	0.22	0.01	0.00	0.01	0.00						
Queue Length 95th (ft)	38	19	1	0	1	0						
Control Delay (s)	150.2	94.1	0.3	0.0	0.3	0.0						
Lane LOS	F	F	A		A							
Approach Delay (s)	150.2	94.1	0.3		0.3							
Approach LOS	F	F										
Intersection Summary												
Average Delay			2.1									
Intersection Capacity Utilization			81.7%		ICU Level of Service							D
Analysis Period (min)			15									

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2019 Opening Year No Build
Timing Plan: PM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	21	184	211	1075	525	39
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	22	194	222	1132	553	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					802	
pX, platoon unblocked	0.80	0.80	0.80			
vC, conflicting volume	2128	553	594			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2286	315	367			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	5	66	75			
cM capacity (veh/h)	23	578	871			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	22	194	1354	553	41	
Volume Left	22	0	222	0	0	
Volume Right	0	194	0	0	41	
cSH	23	578	871	1700	1700	
Volume to Capacity	0.95	0.34	0.25	0.33	0.02	
Queue Length 95th (ft)	70	37	25	0	0	
Control Delay (s)	404.8	14.3	8.4	0.0	0.0	
Lane LOS	F	B	A			
Approach Delay (s)	54.3		8.4	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay			10.7			
Intersection Capacity Utilization			109.2%		ICU Level of Service	
Analysis Period (min)			15			
H						

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2019 Opening Year No Build
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	60	5	22	51	1	9	5	961	98	19	471	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1780	1482		1694	1583	1687	1624	1468	1504	1845	1568	
Fit Permitted	0.74	1.00		0.73	1.00	0.73	1.00	1.00	0.74	1.00	1.00	
Satd. Flow (perm)	1375	1482		1298	1583	1624	1468	144	1845	1568		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	62	5	23	53	1	9	5	1001	102	20	491	14
RTOR Reduction (vph)	0	0	16	0	0	6	0	46	0	0	0	8
Lane Group Flow (vph)	0	67	7	0	54	3	5	1001	56	20	491	6
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Effective Green, g (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Actuated g/C Ratio	0.30	0.30		0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44	0.44
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	408	440		385	470	414	712	644	210	809	688	
v/s Ratio Prot						0.00	c0.62		c0.01	0.27		
v/s Ratio Perm	c0.05	0.00		0.04	0.00	0.01		0.04	0.04		0.00	
v/c Ratio	0.16	0.02		0.14	0.01	0.01	1.41	0.09	0.10	0.61	0.01	
Uniform Delay, d1	26.0	24.8		25.8	24.8	11.9	28.1	16.4	18.9	21.5	15.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.8	0.0	0.0	191.0	0.1	0.2	1.3	0.0	
Delay (s)	26.8	24.9		26.5	24.8	11.9	219.1	16.4	19.1	22.7	15.8	
Level of Service	C	C		C	C	B	F	B	B	C	B	
Approach Delay (s)	26.3			26.3			199.5			22.4		
Approach LOS	C			C			F			C		
Intersection Summary												
HCM 2000 Control Delay	132.6		HCM 2000 Level of Service		F							
HCM 2000 Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		16.6							
Intersection Capacity Utilization	72.8%		ICU Level of Service		C							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2019 Opening Year No Build
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1037	1	1	507
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	1103	1	1	539
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)			669			
Upstream signal (ft)			956			
pX, platoon unblocked	0.67	0.58			0.58	
vC, conflicting volume	1645	1103			1104	
vC1, stage 1 conf vol					6	
vC2, stage 2 conf vol						
vCU, unblocked vol	1112	818			820	
IC, single (s)	6.8	6.8			4.2	
IC, 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	99	99			100	
cM capacity (veh/h)	131	174			449	
Direction, Lane #						
Volume Total	1	1	1103	1	540	
Volume Left	1	0	0	0	1	
Volume Right	0	1	0	1	0	
cSH	131	174	1700	1700	449	
Volume to Capacity	0.01	0.01	0.65	0.00	0.00	
Queue Length 95th (ft)	1	0	0	0	0	
Control Delay (s)	32.7	25.8	0.0	0.0	0.1	
Lane LOS	D	D			A	
Approach Delay (s)	29.2		0.0		0.1	
Approach LOS	D				C	
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	64.6%		ICU Level of Service		C	
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2019 Opening Year No Build
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	8	1	23	6	4	33	12	1037	5	27	478	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	
Fit Protected	0.96	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1257	1583		1808	1583	1543	2888		1770	3430		
Fit Permitted	0.87	1.00		0.92	1.00	0.39	1.00		0.10	1.00		
Satd. Flow (perm)	1148	1583		1706	1583	629	2888		189	3430		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	8	1	24	6	4	34	12	1080	5	28	498	8
RTOR Reduction (vph)	0	0	18	0	0	25	0	0	0	1	0	
Lane Group Flow (vph)	0	9	6	0	10	9	12	1085	0	28	505	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4		
Effective Green, g (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4		
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.58	0.36		0.58	0.36		
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	306	423		455	423	560	1034		452	1228		
v/s Ratio Prot						0.00	c0.38		c0.01	0.15		
v/s Ratio Perm	c0.01	0.00		0.01	0.01	0.01			0.02			
v/c Ratio	0.03	0.02		0.02	0.02	0.02	1.05		0.06	0.41		
Uniform Delay, d1	29.8	29.6		29.7	29.7	10.2	35.3		13.6	26.6		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.1		0.1	0.1	0.0	41.8		0.1	0.2		
Delay (s)	29.9	29.7		29.8	29.8	10.2	77.1		13.7	26.8		
Level of Service	C	C		C	C	B	E		B	C		
Approach Delay (s)	29.8			29.8			76.4			26.1		
Approach LOS	C			C			E			C		
Intersection Summary												
HCM 2000 Control Delay	58.6		HCM 2000 Level of Service		E							
HCM 2000 Volume to Capacity ratio	0.47											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		17.3							
Intersection Capacity Utilization	51.2%		ICU Level of Service		A							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2019 Opening Year (Build)
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	18	24	199	31	236	807
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	19	25	205	32	243	832
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						1238
pX, platoon unblocked	0.77					
vC, conflicting volume	1524	205			237	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1531	205			237	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	67	97			82	
cM capacity (veh/h)	56	806			1324	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	43	205	32	243	832	
Volume Left	19	0	0	243	0	
Volume Right	25	0	32	0	0	
cSH	120	1700	1700	1324	1700	
Volume to Capacity	0.36	0.12	0.02	0.18	0.49	
Queue Length 95th (ft)	37	0	0	17	0	
Control Delay (s)	51.0	0.0	0.0	8.3	0.0	
Lane LOS	F			A		
Approach Delay (s)	51.0	0.0		1.9		
Approach LOS	F					
Intersection Summary						
Average Delay	3.1					
Intersection Capacity Utilization	52.5%		ICU Level of Service		A	
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2019 Opening Year (Build)
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	39	77	196	28	150	1008
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5		8.5	9.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fit	1.00	0.85	1.00		1.00	1.00
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1121	1062	3238		1570	3505
Fit Permitted	0.95	1.00	1.00		0.54	1.00
Satd. Flow (perm)	1121	1062	3238		884	3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	40	79	200	29	153	1029
RTOR Reduction (vph)	0	57	8	0	0	0
Lane Group Flow (vph)	40	22	221	0	153	1029
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4			6	
Actuated Green, G (s)	42.5	42.5	62.5		90.5	90.5
Effective Green, g (s)	42.5	42.5	62.5		90.5	90.5
Actuated g/C Ratio	0.28	0.28	0.42		0.60	0.60
Clearance Time (s)	7.5	7.5	8.5		8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	317	300	1349		627	2114
v/s Ratio Prot	c0.04		0.07		0.03	c0.29
v/s Ratio Perm		0.02			0.11	
v/c Ratio	0.13	0.07	0.16		0.24	0.49
Uniform Delay, d1	39.9	39.4	27.4		13.4	16.7
Progression Factor	1.00	1.00	1.00		0.52	0.61
Incremental Delay, d2	0.8	0.5	0.3		0.8	0.7
Delay (s)	40.8	39.8	27.7		7.7	11.0
Level of Service	D	D	C		A	B
Approach Delay (s)	40.1		27.7			10.6
Approach LOS	D		C			B
Intersection Summary						
HCM 2000 Control Delay	15.4		HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.39					
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	51.2%		ICU Level of Service		A	
Analysis Period (min)	15					
c Critical Lane Group						

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2019 Opening Year (Build)
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1	13	1	15	5	255	7	41	1090	19
Sign Control	Stop			Stop				Free			Free	
Grade	0%			0%				0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	1	1	13	1	15	5	263	7	42	1124	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None				None
Median storage (veh)												
Upstream signal (ft)								942				
pX, platoon unblocked											270	
vC, conflicting volume	1366	1489	562	921	1501	131	1143					
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1366	1489	562	921	1501	131	1143				270	
IC, single (s)	7.5	6.5	6.9	8.0	6.5	7.4	4.1				4.2	
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.6	2.2				2.2	
p0 queue free %	99	99	100	93	99	98	99				97	
cM capacity (veh/h)	100	118	470	188	116	820	607				1269	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	3	30	5	131	131	7	42	562	562	20		
Volume Left	1	13	5	0	0	0	42	0	0	0		
Volume Right	1	15	0	0	0	7	0	0	0	20		
cSH	146	301	607	1700	1700	1700	1269	1700	1700	1700		
Volume to Capacity	0.02	0.10	0.01	0.08	0.08	0.00	0.03	0.33	0.33	0.01		
Queue Length 95th (ft)	2	8	1	0	0	0	3	0	0	0		
Control Delay (s)	30.3	18.3	11.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0		
Lane LOS	D	C	B				A					
Approach Delay (s)	30.3	18.3	0.2				0.3					
Approach LOS	D	C										
Intersection Summary												
Average Delay	0.7											
Intersection Capacity Utilization	44.1%			ICU Level of Service			A					
Analysis Period (min)	15											

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2019 Opening Year (Build)
Timing Plan: AM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	
Volume (veh/h)	6	272	50	229	1	923	22	
Sign Control	Stop			Free		Free		
Grade	0%			0%		0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.95	0.95	
Hourly flow rate (vph)	6	286	53	241	0	972	23	
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type				None			None	
Median storage (veh)								
Upstream signal (ft)							802	
pX, platoon unblocked	0.79	0.79	0.79		0.00			
vC, conflicting volume	1197	486	995		0			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	710	0	453		0			
IC, single (s)	7.1	7.0	4.5		0.0			
IC, 2 stage (s)								
IF (s)	3.7	3.3	2.4		0.0			
p0 queue free %	97	66	93		0			
cM capacity (veh/h)	247	851	767		0			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	
Volume Total	6	286	53	121	121	486	486	
Volume Left	6	0	53	0	0	0	0	
Volume Right	0	286	0	0	0	0	23	
cSH	247	851	767	1700	1700	1700	1700	
Volume to Capacity	0.03	0.34	0.07	0.07	0.07	0.29	0.29	
Queue Length 95th (ft)	2	37	6	0	0	0	0	
Control Delay (s)	19.0	11.4	10.0	0.0	0.0	0.0	0.0	
Lane LOS	C	B	B					
Approach Delay (s)	11.5		1.8			0.0		
Approach LOS	B							
Intersection Summary								
Average Delay	2.5							
Intersection Capacity Utilization	49.0%			ICU Level of Service			A	
Analysis Period (min)	15							

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2019 Opening Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	11	1	8	89	1	17	13	198	21	3	838	69
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	5.3	5.3	5.3	5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Lane Util. Factor	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.96	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1781	1482	1693	1583	1687	3085	1468	1504	3505	1568		
Fit Permitted	0.85	1.00	0.74	1.00	0.31	1.00	1.00	0.46	1.00	1.00		
Satd. Flow (perm)	1575	1482	1320	1583	558	3085	1468	734	3505	1568		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96		
Adj. Flow (vph)	11	1	8	93	1	18	14	206	22	3	873	72
RTOR Reduction (vph)	0	0	5	0	0	11	0	0	15	0	0	48
Lane Group Flow (vph)	0	12	3	0	94	7	14	206	7	3	873	24
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4	8	8	2	5	2	2	6	6		
Permitted Phases	4	4	8	8	2	5	2	2	6	6		
Actuated Green, G (s)	28.0	28.0	28.0	28.0	26.3	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Effective Green, g (s)	28.0	28.0	28.0	28.0	26.3	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Clearance Time (s)	5.3	5.3	5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	588	553	492	590	270	1044	497	299	1187	531		
v/s Ratio Prot	0.01	0.00	c0.07	0.00	0.01	0.01	0.01	0.00	0.01	0.00		0.02
v/c Ratio	0.02	0.01	0.19	0.01	0.05	0.20	0.01	0.01	0.01	0.01	0.74	0.05
Uniform Delay, d1	14.8	14.8	15.9	14.8	16.7	17.6	16.5	16.6	21.8	16.7		
Progression Factor	1.00	1.00	1.00	1.00	1.11	1.07	1.00	0.07	0.07	0.00		
Incremental Delay, d2	0.1	0.0	0.9	0.0	0.4	0.4	0.1	0.0	2.6	0.1		
Delay (s)	14.9	14.8	16.7	14.8	18.9	19.3	16.5	1.2	4.2	0.1		
Level of Service	B	B	B	B	B	B	B	A	A	A		
Approach Delay (s)	14.9		16.4		19.0		3.8					
Approach LOS	B		B		B		A					

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2019 Opening Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	1	1	227	1	20	902
Volume (veh/h)	1	1	227	1	20	902
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	241	1	21	960
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None		None		
Median storage (veh)						
Upstream signal (ft)		669		957		
pX, platoon unblocked	0.77					
vC, conflicting volume	764	121		243		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	121		243		
IC, single (s)	7.6	8.1		4.3		
IC, 2 stage (s)						
IF (s)	3.9	3.9		2.3		
p0 queue free %	100	100		98		
cM capacity (veh/h)	609	750		1258		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	1	1	121	121	1	21	480	480
Volume Left	1	0	0	0	0	21	0	0
Volume Right	0	1	0	0	1	0	0	0
cSH	609	750	1700	1700	1700	1258	1700	1700
Volume to Capacity	0.00	0.00	0.07	0.07	0.00	0.02	0.28	0.28
Queue Length 95th (ft)	0	0	0	0	0	1	0	0
Control Delay (s)	10.9	9.8	0.0	0.0	0.0	7.9	0.0	0.0
Lane LOS	B	A				A		
Approach Delay (s)	10.4		0.0			0.2		
Approach LOS	B							

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2019 Opening Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	1	35	7	2	41	6	214	6	39	879	3
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	5.6	5.6	5.6	5.6	5.6	6.1	5.6	6.1	5.6	6.1	6.1	5.6
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Lane Util. Factor	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.97	1.00	0.96	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1372	1583	1793	1583	1543	2891	1770	3463				
Fit Permitted	0.94	1.00	0.90	1.00	0.16	1.00	0.61	1.00				
Satd. Flow (perm)	1328	1583	1682	1583	263	2891	1134	3463				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2	1	36	7	2	43	6	223	6	41	916	3
RTOR Reduction (vph)	0	0	23	0	0	27	0	3	0	0	0	0
Lane Group Flow (vph)	0	3	13	0	9	16	6	226	0	41	919	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4	8	8	2	5	2	1	6	6		
Permitted Phases	4	4	8	8	2	5	2	1	6	6		
Actuated Green, G (s)	28.0	28.0	28.0	28.0	29.7	24.7	29.7	24.7				
Effective Green, g (s)	28.0	28.0	28.0	28.0	29.7	24.7	29.7	24.7				
Actuated g/C Ratio	0.37	0.37	0.37	0.37	0.40	0.33	0.40	0.33				
Clearance Time (s)	5.6	5.6	5.6	5.6	6.1	5.6	6.1	5.6				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)	495	590	627	590	189	952	491	1140				
v/s Ratio Prot	0.00	0.01	0.01	c0.01	0.01	0.08	c0.01	c0.27				
v/c Ratio	0.01	0.02	0.01	0.03	0.03	0.24	0.08	0.81				
Uniform Delay, d1	14.8	14.9	14.8	14.9	18.3	14.0	23.0					
Progression Factor	1.00	1.00	1.00	1.00	0.29	0.29	1.00	1.00				
Incremental Delay, d2	0.0	0.1	0.0	0.1	0.3	0.6	0.3	6.1				
Delay (s)	14.8	14.9	14.8	15.0	4.6	5.9	14.3	29.1				
Level of Service	B	B	B	B	A	A	B	C				
Approach Delay (s)	14.9		14.9		5.9		28.5					
Approach LOS	B		B		A		C					

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2019 Opening Year (Build)
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	22	182	946	70	194	463
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	23	188	975	72	200	477
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						1238
pX, platoon unblocked	0.90					
vC, conflicting volume	1853	975			1047	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1891	975			1047	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	29	35			70	
cM capacity (veh/h)	32	290			660	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	210	975	72	200	477	
Volume Left	23	0	0	200	0	
Volume Right	188	0	72	0	0	
cSH	155	1700	1700	660	1700	
Volume to Capacity	1.36	0.57	0.04	0.30	0.28	
Queue Length 95th (ft)	325	0	0	32	0	
Control Delay (s)	252.0	0.0	0.0	12.8	0.0	
Lane LOS	F			B		
Approach Delay (s)	252.0	0.0		3.8		
Approach LOS	F					
Intersection Summary						
Average Delay	29.7					
Intersection Capacity Utilization	83.0%		ICU Level of Service		E	
Analysis Period (min)	15					

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2019 Opening Year (Build)
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	43	153	1091	31	90	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5		8.5	9.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fit	1.00	0.85	1.00		1.00	1.00
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1121	1062	3296		1570	3505
Fit Permitted	0.95	1.00	1.00		0.14	1.00
Satd. Flow (perm)	1121	1062	3296		225	3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	44	156	1113	32	92	617
RTOR Reduction (vph)	0	118	1	0	0	0
Lane Group Flow (vph)	44	38	1144	0	92	617
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4			6	
Actuated Green, G (s)	36.5	36.5	75.5		96.5	96.5
Effective Green, g (s)	36.5	36.5	75.5		96.5	96.5
Actuated g/C Ratio	0.24	0.24	0.50		0.64	0.64
Clearance Time (s)	7.5	7.5	8.5		8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.5		3.0	3.5
Lane Grp Cap (vph)	272	258	1658		265	2254
v/s Ratio Prot	c0.04		c0.35		0.03	c0.18
v/s Ratio Perm		0.04			0.19	
v/c Ratio	0.16	0.15	0.69		0.35	0.27
Uniform Delay, d1	44.7	44.5	28.3		16.2	11.6
Progression Factor	1.00	1.00	1.00		0.98	0.78
Incremental Delay, d2	1.3	1.2	2.4		3.5	0.3
Delay (s)	46.0	45.7	30.7		19.4	9.4
Level of Service	D	D	C		B	A
Approach Delay (s)	45.8		30.7			10.7
Approach LOS	D		C			B
Intersection Summary						
HCM 2000 Control Delay	25.3		HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.50					
Actuated Cycle Length (s)	150.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	63.2%		ICU Level of Service		B	
Analysis Period (min)	15					
c. Critical Lane Group						

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2019 Opening Year (Build)
Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	9	1	7	3	1	7	6	1229	3	4	661	5
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	9	1	7	3	1	7	6	1267	3	4	681	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None					None
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.74	0.74		0.74	0.74	0.74				0.74		
vC, conflicting volume	1343	1972	341	1636	1974	634	687			1270		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	764	1613	341	1159	1615	0	687			665		
IC, single (s)	7.5	6.5	6.9	8.0	6.5	7.4	4.1			4.2		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.6	2.2			2.2		
p0 queue free %	96	99	99	97	99	99	99			99		
cM capacity (veh/h)	211	75	655	92	75	747	903			667		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	18	11	6	634	634	3	4	341	341	5		
Volume Left	9	3	6	0	0	0	4	0	0	0		
Volume Right	7	7	0	0	0	3	0	0	0	5		
cSH	255	199	903	1700	1700	1700	667	1700	1700	1700		
Volume to Capacity	0.07	0.06	0.01	0.37	0.37	0.00	0.01	0.20	0.20	0.00		
Queue Length 95th (ft)	5	5	1	0	0	0	0	0	0	0		
Control Delay (s)	20.2	24.2	9.0	0.0	0.0	0.0	10.4	0.0	0.0	0.0		
Lane LOS	C	C	A				B					
Approach Delay (s)	20.2	24.2	0.0				0.1					
Approach LOS	C	C										
Intersection Summary												
Average Delay	0.4											
Intersection Capacity Utilization	44.0%			ICU Level of Service			A					
Analysis Period (min)	15											

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2019 Opening Year (Build)
Timing Plan: PM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	
Volume (veh/h)	21	184	211	1075	1	525	39	
Sign Control	Stop			Free		Free		
Grade	0%			0%		0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.95	0.95	
Hourly flow rate (vph)	22	194	222	1132	0	553	41	
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type				None			None	
Median storage (veh)							802	
Upstream signal (ft)								
pX, platoon unblocked	0.93	0.93	0.93		0.00			
vC, conflicting volume	1563	276	594		0			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1449	61	404		0			
IC, single (s)	7.1	7.0	4.5		0.0			
IC, 2 stage (s)								
IF (s)	3.7	3.3	2.4		0.0			
p0 queue free %	71	79	77		0			
cM capacity (veh/h)	75	915	946		0			
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	
Volume Total	22	194	222	566	566	276	276	
Volume Left	22	0	222	0	0	0	0	
Volume Right	0	194	0	0	0	0	41	
cSH	75	915	946	1700	1700	1700	1700	
Volume to Capacity	0.29	0.21	0.23	0.33	0.33	0.16	0.16	
Queue Length 95th (ft)	27	20	23	0	0	0	0	
Control Delay (s)	71.7	10.0	10.0	0.0	0.0	0.0	0.0	
Lane LOS	F	A	A					
Approach Delay (s)	16.3		1.6			0.0		
Approach LOS	C							
Intersection Summary								
Average Delay	2.7							
Intersection Capacity Utilization	46.4%			ICU Level of Service			A	
Analysis Period (min)	15							

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2019 Opening Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	60	5	22	51	1	9	5	961	98	19	471	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.95	1.00	0.85
Satd. Flow (prot)	1780	1482		1694	1583	1687	3085	1468	1504	3505	1568	
Fit Permitted	0.75	1.00		0.75	1.00	0.30	1.00	1.00	0.23	1.00	1.00	
Satd. Flow (perm)	1406	1482		1330	1583	534	3085	1468	363	3505	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	5	23	53	1	9	5	1001	102	20	491	14
RTOR Reduction (vph)	0	0	14	0	0	6	0	0	67	0	0	9
Lane Group Flow (vph)	0	67	9	0	54	3	5	1001	35	20	491	5
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.0	28.0		28.0	28.0	25.4	25.4	26.3	25.4	25.4	25.4	25.4
Effective Green, g (s)	28.0	28.0		28.0	28.0	25.4	25.4	26.3	25.4	25.4	25.4	25.4
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.34	0.34	0.34	0.35	0.34	0.34	0.34
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	524	553		496	590	257	1044	497	203	1187	531	
v/s Ratio Prot						0.00	c0.32		0.01	c0.14		
v/s Ratio Perm	c0.05	0.01		0.04	0.00	0.01		0.02	0.03		0.00	
v/c Ratio	0.13	0.02		0.11	0.01	0.02	0.96	0.07	0.10	0.41	0.01	
Uniform Delay, d1	15.5	14.8		15.4	14.8	16.8	24.3	16.8	19.5	19.1	16.5	
Progression Factor	1.00	1.00		1.00	1.00	1.04	1.18	3.56	0.63	0.72	1.00	
Incremental Delay, d2	0.5	0.1		0.4	0.0	0.1	16.9	0.2	1.0	1.1	0.0	
Delay (s)	16.0	14.9		15.8	14.8	17.7	45.6	60.0	13.3	14.8	16.5	
Level of Service	B	B		B	B	B	D	E	B	B	B	
Approach Delay (s)	15.7			15.6			46.8			14.8		
Approach LOS	B			B			D			B		

Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2019 Opening Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1037	1	1	507
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	1103	1	1	539
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None		None		
Median storage (veh)						
Upstream signal (ft)		669		957		
pX, platoon unblocked	0.73	0.71		0.71		
vC, conflicting volume	1375	552		1104		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	493	0		315		
IC, single (s)	7.6	8.1		4.3		
IC, 2 stage (s)						
IF (s)	3.9	3.9		2.3		
p0 queue free %	100	100		100		
cM capacity (veh/h)	306	652		833		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	1	1	552	552	1	1	270	270
Volume Left	1	0	0	0	0	1	0	0
Volume Right	0	1	0	0	1	0	0	0
cSH	306	652	1700	1700	833	1700	1700	
Volume to Capacity	0.00	0.00	0.32	0.32	0.00	0.00	0.16	0.16
Queue Length 95th (ft)	0	0	0	0	0	0	0	0
Control Delay (s)	16.8	10.5	0.0	0.0	0.0	9.3	0.0	0.0
Lane LOS	C	B				A		
Approach Delay (s)	13.7		0.0			0.0		
Approach LOS	B							

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2019 Opening Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	8	1	23	6	4	33	12	1037	5	27	478	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.85
Satd. Flow (prot)	1257	1583		1808	1583	1543	2888	1770	3430			
Fit Permitted	0.86	1.00		0.91	1.00	0.41	1.00	0.24	1.00			
Satd. Flow (perm)	1131	1583		1689	1583	673	2888	453	3430			
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1	24	6	4	34	12	1080	5	28	498	8
RTOR Reduction (vph)	0	0	19	0	0	27	0	0	0	1	0	0
Lane Group Flow (vph)	0	9	5	0	10	7	12	1085	0	28	505	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	29.4	29.4		29.4	29.4	95.4	95.4	96.4	96.4	96.4	96.4	96.4
Effective Green, g (s)	29.4	29.4		29.4	29.4	95.4	95.4	96.4	96.4	96.4	96.4	96.4
Actuated g/C Ratio	0.20	0.20		0.20	0.20	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	310		331	310	468	1836	360	2204			
v/s Ratio Prot						0.00	c0.38		0.00	c0.15		
v/s Ratio Perm	c0.01	0.00		0.01	0.00	0.02		0.05				
v/c Ratio	0.04	0.02		0.03	0.02	0.03	0.59	0.08	0.23			
Uniform Delay, d1	48.9	48.6		48.8	48.7	10.3	15.9	12.9	11.2			
Progression Factor	1.00	1.00		1.00	1.00	0.42	0.53	1.00	1.00			
Incremental Delay, d2	0.3	0.1		0.2	0.1	0.0	0.6	0.4	0.2			
Delay (s)	49.2	48.7		48.9	48.8	4.4	9.0	13.3	11.5			
Level of Service	D	D		D	D	A	A	B	B			
Approach Delay (s)	48.9			48.8			9.0		11.6			
Approach LOS	D			D			A		B			

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

Appendix H: Synchro™ Report for Horizon Year (2039)

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2039 Horizon Year No Build
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (veh/h)	27	35	296	47	351	1200
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	28	36	305	48	362	1237
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					1238	
pX, platoon unblocked	0.57					
vC, conflicting volume	2266	305			354	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2849	305			354	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	0	95			70	
cM capacity (veh/h)	4	707			1200	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	64	305	48	362	1237	
Volume Left	28	0	0	362	0	
Volume Right	36	0	48	0	0	
cSH	10	1700	1700	1200	1700	
Volume to Capacity	6.64	0.18	0.03	0.30	0.73	
Queue Length 95th (ft)	Err	0	0	32	0	
Control Delay (s)	Err	0.0	0.0	9.3	0.0	
Lane LOS	F	F	A	A	F	
Approach Delay (s)	Err	0.0		2.1		
Approach LOS	F					
Intersection Summary						
Average Delay		318.6				
Intersection Capacity Utilization		73.5%		ICU Level of Service		D
Analysis Period (min)		15				

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2039 Horizon Year No Build
Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Volume (vph)	58	114	291	42	224	1497
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	1.00	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	1743	1442	1570	1845
Fit Permitted	0.95	1.00	1.00	1.00	0.35	1.00
Satd. Flow (perm)	1121	1062	1743	1442	583	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	59	116	297	43	229	1528
RTOR Reduction (vph)	0	73	0	31	0	0
Lane Group Flow (vph)	59	43	297	12	229	1528
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	336	817
v/s Ratio Prot	c0.05		0.17		0.05	c0.83
v/s Ratio Perm		0.04		0.01	0.25	
v/c Ratio	0.14	0.11	0.61	0.03	0.68	1.87
Uniform Delay, d1	19.0	18.7	28.0	23.5	19.2	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.6	2.1	0.0	5.6	396.3
Delay (s)	19.7	19.3	30.2	23.5	24.8	421.3
Level of Service	B	B	C	C	C	F
Approach Delay (s)	19.4		29.3		369.7	
Approach LOS	B		C		F	
Intersection Summary						
HCM 2000 Control Delay		291.8		HCM 2000 Level of Service		F
HCM 2000 Volume to Capacity ratio		1.21				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)		24.5
Intersection Capacity Utilization		98.8%		ICU Level of Service		F
Analysis Period (min)		15				

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2039 Horizon Year No Build
Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1	15	1	17	6	380	8	45	1620	21
Sign Control	Stop			Stop				Free		Free		
Grade	0%			0%				0%		0%		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	1	1	15	1	18	6	392	8	46	1670	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None		None		
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.88	0.88		0.88	0.88	0.88				0.88		
vC, conflicting volume	2185	2175	1670	2169	2189	392	1692			400		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2282	2271	1670	2264	2287	234	1692			244		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	95	97	99	24	97	97	98			96		
cM capacity (veh/h)	22	33	119	20	33	654	377			1143		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	3	34	398	8	1716	22						
Volume Left	1	15	6	0	46	0						
Volume Right	1	18	0	8	0	22						
cSH	36	41	377	1700	1143	1700						
Volume to Capacity	0.09	0.82	0.02	0.00	0.04	0.01						
Queue Length 95th (ft)	7	79	1	0	3	0						
Control Delay (s)	114.1	235.6	0.5	0.0	8.3	0.0						
Lane LOS	F	F	A		A							
Approach Delay (s)	114.1	235.6	0.5		8.2							
Approach LOS	F	F										
Intersection Summary												
Average Delay					10.5							
Intersection Capacity Utilization					121.4%			ICU Level of Service				H
Analysis Period (min)					15							

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2039 Horizon Year No Build
Timing Plan: AM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	10	404	74	341	1372	32
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	425	78	359	1444	34
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					802	
pX, platoon unblocked	0.57	0.57	0.57			
vC, conflicting volume	1959	1444	1478			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2305	1402	1461			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	27	0	66			
cM capacity (veh/h)	14	97	232			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	11	425	437	1444	34	
Volume Left	11	0	78	0	0	
Volume Right	0	425	0	0	34	
cSH	14	97	232	1700	1700	
Volume to Capacity	0.73	4.37	0.34	0.85	0.02	
Queue Length 95th (ft)	44	Err	35	0	0	
Control Delay (s)	488.7	Err	14.9	0.0	0.0	
Lane LOS	F	F	B			
Approach Delay (s)	9769.3		14.9	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay				1814.0		
Intersection Capacity Utilization				103.9%		ICU Level of Service
Analysis Period (min)				15		G

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2039 Horizon Year No Build
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	12	1	9	109	1	29	15	294	25	4	1245	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1781	1482		1693	1583	1687	1624	1468	1504	1845	1568	
Fit Permitted	0.82	1.00		0.72	1.00	0.09	1.00	1.00	0.50	1.00	1.00	1.00
Satd. Flow (perm)	1530	1482		1277	1583	162	1624	1468	797	1845	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	12	1	9	114	1	30	16	306	26	4	1297	80
RTOR Reduction (vph)	0	0	6	0	0	21	0	0	15	0	0	45
Lane Group Flow (vph)	0	13	3	0	115	9	16	306	11	4	1297	35
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4		4	8		8	2		2		6	
Permitted Phases	4		4	8		8	2		2		6	
Actuated Green, G (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Effective Green, g (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Actuated g/C Ratio	0.30	0.30		0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44	0.44
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	454	440		379	470	236	712	644	497	809	688	
v/s Ratio Prot						c0.01	0.19		0.00	c0.70		
v/s Ratio Perm	0.01	0.00		c0.09	0.01	0.03		0.01	0.00		0.02	
v/c Ratio	0.03	0.01		0.30	0.02	0.07	0.43	0.02	0.01	1.60	0.05	
Uniform Delay, d1	24.9	24.8		27.2	24.9	18.9	19.4	15.9	10.9	28.1	16.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0		2.1	0.1	0.1	0.4	0.0	0.0	27.2	0.0	
Delay (s)	25.0	24.8		29.2	24.9	19.0	19.8	15.9	10.9	305.3	16.1	
Level of Service	C	C		C	C	B	B	B	B	F	B	
Approach Delay (s)	24.9			28.3			19.5			287.7		
Approach LOS	C			C			B			F		
Intersection Summary												
HCM 2000 Control Delay	215.6			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	0.96											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)			16.6					
Intersection Capacity Utilization	89.7%			ICU Level of Service			E					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2039 Horizon Year No Build
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	338	1	20	1340
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	360	1	21	1426
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)			None		None	
Median type						
Median storage (veh)						
Upstream signal (ft)			669		956	
pX, platoon unblocked	0.68	0.89			0.89	
vC, conflicting volume	1828	360			361	
vC1, stage 1 conf vol					6	
vC2, stage 2 conf vol						
vCU, unblocked vol	1608	215			216	
IC, single (s)	6.8	6.8			4.2	
IC, 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	98	100			98	
cM capacity (veh/h)	63	620			1156	
Direction, Lane #						
	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total	1	1	360	1	1447	
Volume Left	1	0	0	0	21	
Volume Right	0	1	0	1	0	
cSH	63	620	1700	1700	1156	
Volume to Capacity	0.02	0.00	0.21	0.00	0.02	
Queue Length 95th (ft)	1	0	0	0	1	
Control Delay (s)	63.0	10.8	0.0	0.0	1.0	
Lane LOS	F	B			A	
Approach Delay (s)	36.9		0.0		1.0	
Approach LOS	E					
Intersection Summary						
Average Delay	0.9					
Intersection Capacity Utilization	96.5%			ICU Level of Service		
Analysis Period (min)	15			F		

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2039 Horizon Year No Build
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	3	1	51	7	2	29	10	318	6	24	1036	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1327	1583		1793	1583	1543	2890		1770	3459		
Fit Permitted	0.92	1.00		0.89	1.00	0.10	1.00		0.52	1.00		1.00
Satd. Flow (perm)	1264	1583		1664	1583	168	2890		966	3459		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	3	1	53	7	2	30	10	331	6	25	1079	5
RTOR Reduction (vph)	0	0	39	0	0	22	0	1	0	0	0	0
Lane Group Flow (vph)	0	4	14	0	9	8	10	336	0	25	1084	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4		4	8		8	2			1	6	
Permitted Phases	4		4	8		8	2			1	6	
Actuated Green, G (s)	29.4	29.4		29.4	29.4	62.6	38.7		62.6	38.7		
Effective Green, g (s)	29.4	29.4		29.4	29.4	62.6	38.7		62.6	38.7		
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.57	0.35		0.57	0.35		
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	339	425		447	425	396	1023		729	1224		
v/s Ratio Prot						0.01	0.12		c0.01	c0.31		
v/s Ratio Perm	0.00	c0.01		0.01	0.01	0.01			0.01			
v/c Ratio	0.01	0.03		0.02	0.02	0.03	0.33		0.03	0.89		
Uniform Delay, d1	29.3	29.5		29.4	29.4	13.5	25.8		10.1	33.2		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.1	0.1		0.1	0.1	0.0	0.2		0.0	8.0		
Delay (s)	29.4	29.6		29.4	29.4	13.5	26.0		10.2	41.2		
Level of Service	C	C		C	C	B	C		B	D		
Approach Delay (s)	29.6			29.4			25.6			40.5		
Approach LOS	C			C			C			D		
Intersection Summary												
HCM 2000 Control Delay	36.5			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.39											
Actuated Cycle Length (s)	109.3			Sum of lost time (s)			17.3					
Intersection Capacity Utilization	51.1%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
1: Sycolin Rd & Claudia Dr

2039 Horizon Year No Build
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (veh/h)	32	270	1406	105	288	688
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	33	278	1449	108	297	709
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					1238	
pX, platoon unblocked	0.61					
vC, conflicting volume	2753	1449			1558	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3562	1449			1558	
IC, single (s)	7.1	6.3			4.1	
IC, 2 stage (s)						
IF (s)	4.1	3.4			2.2	
p0 queue free %	0	0			30	
cM capacity (veh/h)	1	151			422	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	311	1449	108	297	709	
Volume Left	33	0	0	297	0	
Volume Right	278	0	108	0	0	
cSH	5	1700	1700	422	1700	
Volume to Capacity	59.31	0.85	0.06	0.70	0.42	
Queue Length 95th (ft)	Err	0	0	133	0	
Control Delay (s)	Err	0.0	0.0	31.4	0.0	
Lane LOS	F	F	D	D	F	
Approach Delay (s)	Err	0.0		9.3		
Approach LOS	F					
Intersection Summary						
Average Delay		1086.0				
Intersection Capacity Utilization		118.4%		ICU Level of Service	H	
Analysis Period (min)		15				

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
2: Sycolin Rd & Loudoun Center Pl

2039 Horizon Year No Build
Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (vph)	64	227	1621	47	134	899
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fit	1.00	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	1743	1442	1570	1845
Fit Permitted	0.95	1.00	1.00	1.00	0.12	1.00
Satd. Flow (perm)	1121	1062	1743	1442	201	1845
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	65	232	1654	48	137	917
RTOR Reduction (vph)	0	147	0	13	0	0
Lane Group Flow (vph)	65	85	1654	35	137	917
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	33.1	33.1	25.3	25.3	39.9	39.9
Effective Green, g (s)	33.1	33.1	25.3	25.3	39.9	39.9
Actuated g/C Ratio	0.37	0.37	0.28	0.28	0.44	0.44
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	412	390	489	405	197	817
v/s Ratio Prot	0.06		c0.95		0.05	c0.50
v/s Ratio Perm		c0.08		0.02	0.25	
v/c Ratio	0.16	0.22	3.38	0.09	0.70	1.12
Uniform Delay, d1	19.1	19.6	32.4	23.8	20.3	25.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.3	1077.3	0.1	10.2	70.8
Delay (s)	19.9	20.8	1109.6	23.9	30.5	95.8
Level of Service	B	C	F	C	C	F
Approach Delay (s)	20.6		1079.0		87.4	
Approach LOS	C		F		F	
Intersection Summary						
HCM 2000 Control Delay		633.7		HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio		1.64				
Actuated Cycle Length (s)		90.0		Sum of lost time (s)	24.5	
Intersection Capacity Utilization		119.0%		ICU Level of Service	H	
Analysis Period (min)		15				

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2039 Horizon Year No Build
Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	10	0	8	3	1	8	7	1826	3	5	983	9
Sign Control	Stop		Stop			Free		Free		Free		
Grade	0%		0%			0%		0%		0%		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	10	0	8	3	1	8	7	1882	3	5	1013	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.74	0.74		0.74	0.74	0.74				0.74		
vC, conflicting volume	2929	2924	1013	2929	2930	1882	1023			1886		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3435	3428	1013	3434	3436	2018	1023			2022		
IC, single (s)	7.1	6.5	6.2	7.3	6.5	6.5	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.5	2.2			2.2		
p0 queue free %	0	100	97	0	79	82	99			97		
cM capacity (veh/h)	2	5	290	2	5	46	679			203		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	19	12	1890	3	1019	9						
Volume Left	10	3	7	0	5	0						
Volume Right	8	8	0	3	0	9						
cSH	4	7	679	1700	203	1700						
Volume to Capacity	5.24	1.75	0.01	0.00	0.03	0.01						
Queue Length 95th (ft)	Err	63	1	0	2	0						
Control Delay (s)	Err	1339.5	0.0	0.0	1.6	0.0						
Lane LOS	F	F	A	A	A	A						
Approach Delay (s)	Err	1339.5	0.0		1.6							
Approach LOS	F	F										
Intersection Summary												
Average Delay			69.0									
Intersection Capacity Utilization			113.2%		ICU Level of Service	H						
Analysis Period (min)			15									

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
4: Sycolin Rd/Sycolin Rd & Miller Dr

2039 Horizon Year No Build
Timing Plan: PM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	31	273	314	1597	780	58
Sign Control	Stop		Free	Free	Free	
Grade	0%		0%	0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	33	287	331	1681	821	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)					802	
Upstream signal (ft)						
pX, platoon unblocked	0.62	0.62	0.62			
vC, conflicting volume	3163	821	882			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4193	401	500			
IC, single (s)	6.6	6.2	4.3			
IC, 2 stage (s)						
IF (s)	3.7	3.3	2.4			
p0 queue free %	0	28	45			
cM capacity (veh/h)	1	400	599			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2	
Volume Total	33	287	2012	821	61	
Volume Left	33	0	331	0	0	
Volume Right	0	287	0	0	61	
cSH	1	400	599	1700	1700	
Volume to Capacity	58.35	0.72	0.55	0.48	0.04	
Queue Length 95th (ft)	Err	138	84	0	0	
Control Delay (s)	Err	33.9	18.2	0.0	0.0	
Lane LOS	F	D	C			
Approach Delay (s)	1050.1		18.2	0.0		
Approach LOS	F					
Intersection Summary						
Average Delay			115.9			
Intersection Capacity Utilization			155.8%		ICU Level of Service	H
Analysis Period (min)			15			

Rinker Design Associates, P.C.

Synchro 8 Report
Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2039 Horizon Year No Build
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	67	6	25	62	1	11	6	1428	119	23	700	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1781	1482		1694	1583	1687	1624	1468	1504	1845	1568	
Fit Permitted	0.72	1.00		0.71	1.00	0.10	1.00	1.00	0.09	1.00	1.00	
Satd. Flow (perm)	1348	1482		1260	1583	186	1624	1468	144	1845	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	70	6	26	65	1	11	6	1488	124	24	729	16
RTOR Reduction (vph)	0	0	18	0	0	8	0	0	46	0	0	9
Lane Group Flow (vph)	0	76	8	0	66	3	6	1488	78	24	729	7
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4		4	8		8	5	2		2	1	6
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Effective Green, g (s)	29.7	29.7		29.7	29.7	53.7	43.9	43.9	53.7	43.9	43.9	43.9
Actuated g/C Ratio	0.30	0.30		0.30	0.30	0.54	0.44	0.44	0.54	0.44	0.44	0.44
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	400	440		374	470	246	712	644	210	809	688	
v/s Ratio Prot						0.00	c0.92		c0.01	0.40		
v/s Ratio Perm	c0.06	0.01		0.05	0.00	0.01		0.05	0.05		0.00	
v/c Ratio	0.19	0.02		0.18	0.01	0.02	2.09	0.12	0.11	0.90	0.01	
Uniform Delay, d1	26.2	24.8		26.1	24.8	15.9	28.1	16.6	19.0	26.0	15.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.1		1.0	0.0	0.0	495.3	0.1	0.2	13.1	0.0	
Delay (s)	27.2	24.9		27.1	24.8	16.0	523.3	16.7	19.2	39.2	15.8	
Level of Service	C	C		C	C	B	F	B	B	D	B	
Approach Delay (s)	26.6			26.8			482.6			38.1		
Approach LOS	C			C			F			D		

Intersection Summary			
HCM 2000 Control Delay	317.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2039 Horizon Year No Build
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1541	1	1	753
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	1639	1	1	801
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)			None		None	
Median type						
Median storage (veh)						
Upstream signal (ft)			669			956
pX, platoon unblocked	0.73	0.58			0.58	
vC, conflicting volume	2443	1639			1640	
vC1, stage 1 conf vol					6	
vC2, stage 2 conf vol						
vCU, unblocked vol	1901	1739			1741	
IC, single (s)	6.8	6.8			4.2	
IC, 2 stage (s)						
IF (s)	3.9	3.8			2.3	
p0 queue free %	98	98			99	
cM capacity (veh/h)	44	45			197	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	1	1	1639	1	802
Volume Left	1	0	0	0	1
Volume Right	0	1	0	1	0
cSH	44	45	1700	1700	197
Volume to Capacity	0.02	0.02	0.96	0.00	0.01
Queue Length 95th (ft)	2	2	0	0	0
Control Delay (s)	89.7	87.1	0.0	0.0	0.3
Lane LOS	F	F	A	A	A
Approach Delay (s)	88.4		0.0		0.3
Approach LOS	F		A		C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2039 Horizon Year No Build
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	8	1	23	6	4	22	18	1504	5	18	711	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	
Fit Protected	1.00	0.85		1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	
Fit Permitted	0.96	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1257	1583		1808	1583	1543	2888	1770	3433			
Fit Permitted	0.87	1.00		0.92	1.00	0.23	1.00	1.00	0.10	1.00		
Satd. Flow (perm)	1148	1583		1706	1583	379	2888		189	3433		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	8	1	24	6	4	23	19	1567	5	19	741	11
RTOR Reduction (vph)	0	0	18	0	0	17	0	0	0	0	1	0
Lane Group Flow (vph)	0	9	6	0	10	6	19	1572	0	19	751	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4		4	8		8	5	2		1	6	
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4		
Effective Green, g (s)	29.4	29.4		29.4	29.4	63.3	39.4		63.3	39.4		
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.58	0.36		0.58	0.36		
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	306	423		455	423	471	1034		452	1229		
v/s Ratio Prot						0.01	c0.54		c0.01	0.22		
v/s Ratio Perm	c0.01	0.00		0.01	0.00	0.01			0.02			
v/c Ratio	0.03	0.02		0.02	0.01	0.04	1.52		0.04	0.61		
Uniform Delay, d1	29.8	29.6		29.7	29.6	11.0	35.3		15.8	29.0		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.1		0.1	0.1	0.0	239.1		0.0	0.9		
Delay (s)	29.9	29.7		29.8	29.7	11.0	274.4		15.8	29.9		
Level of Service	C	C		C	C	B	F		B	C		
Approach Delay (s)	29.8			29.7			271.3			29.6		
Approach LOS	C			C			F			C		

Intersection Summary			
HCM 2000 Control Delay	188.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 1: Sycolin Rd & Claudia Dr

2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (vph)	27	35	296	47	351	1200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Fit	0.98	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.96	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1097	1346	1759	1196	1752	1810
Fit Permitted	0.96	1.00	1.00	1.00	0.57	1.00
Satd. Flow (perm)	1097	1346	1759	1196	1045	1810
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	28	36	305	48	362	1237
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	33	31	305	48	362	1237
Heavy Vehicles (%)	71%	14%	8%	35%	3%	5%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4	4	2	2	1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	7.5	7.5	54.2	54.2	76.5	75.5
Effective Green, g (s)	7.5	7.5	54.2	54.2	76.5	75.5
Actuated g/C Ratio	0.08	0.08	0.54	0.54	0.76	0.76
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	82	100	953	648	896	1366
vis Ratio Prot	c0.03		0.17		0.06	c0.68
vis Ratio Perm		0.02		0.04	0.25	
v/c Ratio	0.40	0.31	0.32	0.07	0.40	0.91
Uniform Delay, d1	44.1	43.8	12.7	10.9	4.5	9.5
Progression Factor	1.00	1.00	1.00	1.00	0.03	1.04
Incremental Delay, d2	3.2	1.8	0.9	0.2	0.2	5.7
Delay (s)	47.3	45.6	13.6	11.1	0.3	15.6
Level of Service	D	D	B	B	A	B
Approach Delay (s)	46.5		13.2		12.2	
Approach LOS	D		B		B	
Intersection Summary						
HCM 2000 Control Delay	13.4		HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.95					
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	83.2%		ICU Level of Service		E	
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis
 2: Sycolin Rd & Loudoun Center Pl

2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (vph)	58	114	291	42	224	1497
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5		8.5	9.5
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Fit	1.00	0.85	0.98		1.00	1.00
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1121	1062	3238		1570	3505
Fit Permitted	0.95	1.00	1.00		0.42	1.00
Satd. Flow (perm)	1121	1062	3238		690	3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	59	116	297	43	229	1528
RTOR Reduction (vph)	0	78	11	0	0	0
Lane Group Flow (vph)	59	38	329	0	229	1528
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4			6	
Actuated Green, G (s)	33.0	33.0	28.4		50.0	50.0
Effective Green, g (s)	33.0	33.0	28.4		50.0	50.0
Actuated g/C Ratio	0.33	0.33	0.28		0.50	0.50
Clearance Time (s)	7.5	7.5	8.5		8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.5		3.0	3.5
Lane Grp Cap (vph)	369	350	919		469	1752
vis Ratio Prot	c0.05		0.10		0.07	c0.44
vis Ratio Perm		0.04			0.18	
v/c Ratio	0.16	0.11	0.36		0.49	0.87
Uniform Delay, d1	23.7	23.3	28.5		15.1	22.2
Progression Factor	1.00	1.00	0.63		0.38	0.43
Incremental Delay, d2	0.9	0.6	1.1		3.2	5.6
Delay (s)	24.6	23.9	19.0		9.0	15.2
Level of Service	C	C	B		A	B
Approach Delay (s)	24.2		19.0		14.4	
Approach LOS	C		B		B	
Intersection Summary						
HCM 2000 Control Delay	15.8		HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.65					
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	61.4%		ICU Level of Service		B	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1	15	1	17	6	380	8	45	1620	21
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1	1	1	15	1	18	6	392	8	46	1670	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	1989	2175	835	1334	2189	196	1692			400		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1972	2162	835	1306	2175	149	1692			357		
IC, single (s)	7.5	6.5	6.9	8.0	6.5	7.4	4.1			4.2		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.6	2.2			2.2		
p0 queue free %	97	98	100	83	98	98	98			96		
cM capacity (veh/h)	34	43	311	90	43	784	373			1158		
Direction, Lane #												
Volume Total	3	34	6	196	196	8	46	835	835	22		
Volume Left	1	15	6	0	0	0	46	0	0	0		
Volume Right	1	18	0	0	0	8	0	0	0	22		
cSH	53	156	373	1700	1700	1700	1158	1700	1700	1700		
Volume to Capacity	0.06	0.22	0.02	0.12	0.12	0.00	0.04	0.49	0.49	0.01		
Queue Length 95th (ft)	4	20	1	0	0	0	3	0	0	0		
Control Delay (s)	76.4	34.3	14.8	0.0	0.0	0.0	8.2	0.0	0.0	0.0		
Lane LOS	F	D	B				A					
Approach Delay (s)	76.4	34.3	0.2				0.2					
Approach LOS	F	D										
Intersection Summary												
Average Delay	0.9		ICU Level of Service		A							
Intersection Capacity Utilization	54.8%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 4: Sycolin Rd/Sycolin Rd & Miller Dr

2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR	
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	
Volume (veh/h)	10	404	74	341	1	1372	32	
Sign Control	Stop			Free	Free			
Grade	0%			0%		0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.95	0.95	
Hourly flow rate (vph)	11	425	78	359	0	1444	34	
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type			None			None		
Median storage (veh)						802		
Upstream signal (ft)								
pX, platoon unblocked	0.70	0.70	0.70		0.00			
vC, conflicting volume	1779	722	1478		0			
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	1256	0	825		0			
IC, single (s)	7.1	7.0	4.5		0.0			
IC, 2 stage (s)								
IF (s)	3.7	3.3	2.4		0.0			
p0 queue free %	88	44	84		0			
cM capacity (veh/h)	84	756	479		0			
Direction, Lane #								
Volume Total	11	425	78	179	179	722	34	
Volume Left	11	0	78	0	0	0	0	
Volume Right	0	425	0	0	0	0	34	
cSH	84	756	479	1700	1700	1700	1700	
Volume to Capacity	0.12	0.56	0.16	0.11	0.11	0.42	0.02	
Queue Length 95th (ft)	10	89	14	0	0	0	0	
Control Delay (s)	53.6	15.7	14.0	0.0	0.0	0.0	0.0	
Lane LOS	F	C	B					
Approach Delay (s)	16.6		2.5			0.0		
Approach LOS	C							
Intersection Summary								
Average Delay	3.5		ICU Level of Service		C			
Intersection Capacity Utilization	69.6%							
Analysis Period (min)	15							

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	12	1	9	109	1	29	15	294	25	4	1245	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1781	1482		1693	1583	1687	3085	1468	1504	3505	1568	
Fit Permitted	0.82	1.00		0.72	1.00	0.15	1.00	1.00	0.50	1.00	1.00	
Satd. Flow (perm)	1523	1482		1277	1583	264	3085	1468	793	3505	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	12	1	9	114	1	30	16	306	26	4	1297	80
RTOR Reduction (vph)	0	0	6	0	0	22	0	0	13	0	0	40
Lane Group Flow (vph)	0	13	3	0	115	8	16	306	13	4	1297	40
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.0	28.0		28.0	28.0	51.3	50.4	50.4	50.4	50.4	50.4	50.4
Effective Green, g (s)	28.0	28.0		28.0	28.0	51.3	50.4	50.4	50.4	50.4	50.4	50.4
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.51	0.50	0.50	0.50	0.50	0.50	0.50
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	426	414		357	443	206	1554	739	435	1766	790	
v/s Ratio Prot							c0.10					c0.37
v/s Ratio Perm	0.01	0.00		c0.09	0.01	0.04		0.01	0.00			0.03
v/c Ratio	0.03	0.01		0.32	0.02	0.08	0.20	0.02	0.01		0.73	0.05
Uniform Delay, d1	26.1	26.0		28.5	26.1	20.5	13.7	12.4	12.5		19.5	12.6
Progression Factor	1.00	1.00		1.00	1.00	0.36	0.37	1.00	0.04		0.13	0.02
Incremental Delay, d2	0.1	0.0		2.4	0.1	0.7	0.3	0.0	0.0		1.8	0.1
Delay (s)	26.3	26.0		30.9	26.1	8.1	5.3	12.5	0.6		4.2	0.3
Level of Service	C	C		C	C	A	A	B	A		A	A
Approach Delay (s)	26.2			29.9			6.0				4.0	
Approach LOS	C			C			A				A	

Intersection Summary			
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	338	1	20	1340
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	360	1	21	1426
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None		None		
Median storage (veh)						
Upstream signal (ft)			669			957
pX platoon unblocked	0.67	0.98			0.98	
vC conflicting volume	1115	180			361	
vC1 stage 1 conf vol					6	
vC2 stage 2 conf vol						
vCu unblocked vol	35	119			304	
IC single (s)	7.6	8.1			4.3	
IC 2 stage (s)						
IF (s)	3.9	3.9			2.3	
p0 queue free %	100	100			98	
cM capacity (veh/h)	573	737			1166	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	1	1	180	180	1	21	713	713
Volume Left	1	0	0	0	0	21	0	0
Volume Right	0	1	0	0	1	0	0	0
cSH	573	737	1700	1700	1700	1166	1700	1700
Volume to Capacity	0.00	0.00	0.11	0.11	0.00	0.02	0.42	0.42
Queue Length 95th (ft)	0	0	0	0	0	1	0	0
Control Delay (s)	11.3	9.9	0.0	0.0	0.0	8.1	0.0	0.0
Lane LOS	B	A				A		
Approach Delay (s)	10.6		0.0			0.1		
Approach LOS	B							

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2039 Horizon Year (Build)
 Timing Plan: AM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	3	1	51	7	2	29	10	318	6	24	1306	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1327	1583		1793	1583	1543	2890		1770	3462		
Fit Permitted	0.92	1.00		0.89	1.00	0.09	1.00		0.55	1.00		
Satd. Flow (perm)	1263	1583		1665	1583	140	2890		1022	3462		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	3	1	53	7	2	30	10	331	6	25	1360	5
RTOR Reduction (vph)	0	0	38	0	0	22	0	1	0	0	0	0
Lane Group Flow (vph)	0	4	15	0	9	8	10	336	0	25	1365	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	28.0	28.0		28.0	28.0	54.7	49.4		54.7	49.4		
Effective Green, g (s)	28.0	28.0		28.0	28.0	54.7	49.4		54.7	49.4		
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.55	0.49		0.55	0.49		
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	353	443		466	443	150	1427		598	1710		
v/s Ratio Prot							c0.00	0.12		0.00		c0.39
v/s Ratio Perm	0.00	c0.01		0.01	0.01	0.03		0.02		0.02		
v/c Ratio	0.01	0.03		0.02	0.02	0.07	0.24		0.04	0.80		
Uniform Delay, d1	26.0	26.2		26.1	26.1	14.4	14.5		10.4	21.1		
Progression Factor	1.00	1.00		1.00	1.00	0.59	1.04		1.00	1.00		
Incremental Delay, d2	0.1	0.1		0.1	0.1	0.8	0.4		0.1	4.0		
Delay (s)	26.1	26.3		26.1	26.1	9.4	15.5		10.5	25.1		
Level of Service	C	C		C	C	A	B		B	C		
Approach Delay (s)	26.3			26.1			15.3			24.9		
Approach LOS	C			C			B			C		

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group
 Rinker Design Associates, P.C. Synchro 8 Report
 Sycolin Road Phase IV Widening

HCM Signalized Intersection Capacity Analysis
 1: Sycolin Rd & Claudia Dr
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (vph)	32	270	1406	105	288	688
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00
Fit	0.88	0.85	1.00	0.85	1.00	1.00
Fit Protected	0.99	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1316	1346	1759	1196	1752	1810
Fit Permitted	0.99	1.00	1.00	1.00	0.83	1.00
Satd. Flow (perm)	1316	1346	1759	1196	59	1810
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	33	278	1449	108	297	709
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	158	153	1449	108	297	709
Heavy Vehicles (%)	71%	14%	8%	35%	3%	5%
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	19.5	19.5	116.5	116.5	144.5	143.5
Effective Green, g (s)	19.5	19.5	116.5	116.5	144.5	143.5
Actuated g/C Ratio	0.11	0.11	0.65	0.65	0.80	0.80
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.5	3.5	3.0	3.5
Lane Grp Cap (vph)	142	145	1138	774	230	1442
vis Ratio Prot	c0.12		0.82		c0.14	0.39
vis Ratio Perm		0.11		0.09	c0.89	
v/c Ratio	1.11	1.06	1.27	0.14	1.29	0.49
Uniform Delay, d1	80.2	80.2	31.8	12.3	74.7	6.1
Progression Factor	1.00	1.00	1.00	1.00	0.99	0.69
Incremental Delay, d2	109.0	90.2	130.0	0.4	158.4	1.1
Delay (s)	189.2	170.4	161.7	12.7	232.4	5.4
Level of Service	F	F	F	B	F	A
Approach Delay (s)	180.0		151.4		72.4	
Approach LOS	F		F		E	
Intersection Summary						
HCM 2000 Control Delay	126.8		HCM 2000 Level of Service		F	
HCM 2000 Volume to Capacity ratio	1.31					
Actuated Cycle Length (s)	180.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	117.7%		ICU Level of Service		H	
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis
 2: Sycolin Rd & Loudoun Center Pl
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↑	↔	↔
Volume (vph)	64	227	1621	47	134	899
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	1.00
Fit	1.00	0.85	1.00	1.00	1.00	1.00
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1121	1062	3295	1570	3505	
Fit Permitted	0.95	1.00	1.00	1.00	0.84	1.00
Satd. Flow (perm)	1121	1062	3295	1570	74	3505
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	65	232	1654	48	137	917
RTOR Reduction (vph)	0	141	1	0	0	0
Lane Group Flow (vph)	65	91	1701	0	137	917
Heavy Vehicles (%)	61%	52%	9%	12%	15%	3%
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2	6	
Actuated Green, G (s)	34.5	34.5	103.5	128.5	128.5	128.5
Effective Green, g (s)	34.5	34.5	103.5	128.5	128.5	128.5
Actuated g/C Ratio	0.19	0.19	0.58	0.71	0.71	0.71
Clearance Time (s)	7.5	7.5	8.5	8.5	8.5	9.5
Vehicle Extension (s)	3.0	3.0	3.5	3.0	3.0	3.5
Lane Grp Cap (vph)	214	203	1894	198	2502	
vis Ratio Prot	0.06		c0.52		c0.07	0.26
vis Ratio Perm		c0.09		0.43		
v/c Ratio	0.30	0.45	0.90	0.69	0.37	
Uniform Delay, d1	62.4	64.4	33.6	53.1	10.0	
Progression Factor	1.00	1.00	0.53	1.00	1.00	
Incremental Delay, d2	3.6	7.1	0.7	18.1	0.4	
Delay (s)	66.1	71.4	18.6	71.2	10.4	
Level of Service	E	E	B	E	B	
Approach Delay (s)	70.2		18.6		18.3	
Approach LOS	E		B		B	
Intersection Summary						
HCM 2000 Control Delay	23.5		HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.78					
Actuated Cycle Length (s)	180.0		Sum of lost time (s)		24.5	
Intersection Capacity Utilization	80.0%		ICU Level of Service		D	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
 3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	10	1	8	3	1	8	7	1826	3	5	983	6
Sign Control	Stop		Stop		Stop		Free		Free		Free	
Grade	0%		0%		0%		0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	10	1	8	3	1	8	7	1882	3	5	1013	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)								942				
Upstream signal (ft)												
pX, platoon unblocked	0.53	0.53		0.53	0.53	0.53					0.53	
vC, conflicting volume	1988	2924	507	2423	2927	941	1020				1886	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1099	2857	507	1915	2862	0	1020				906	
IC, single (s)	7.5	6.5	6.9	8.0	6.5	7.4	4.1				4.2	
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.7	4.0	3.6	2.2				2.2	
p0 queue free %	87	88	98	79	88	98	99				99	
cM capacity (veh/h)	78	9	511	15	9	537	676				388	
Direction, Lane #												
Volume Total	20	12	7	941	941	3	5	507	507	6		
Volume Left	10	3	7	0	0	0	5	0	0	0		
Volume Right	8	8	0	0	0	3	0	0	0	6		
cSH	73	36	676	1700	1700	388	1700	1700	1700	1700		
Volume to Capacity	0.27	0.34	0.01	0.55	0.55	0.00	0.01	0.30	0.30	0.00		
Queue Length 95th (ft)	24	28	1	0	0	1	0	0	0	0		
Control Delay (s)	71.3	149.3	10.4	0.0	0.0	0.0	14.4	0.0	0.0	0.0		
Lane LOS	F	F	B				B					
Approach Delay (s)	71.3	149.3	0.0				0.1					
Approach LOS	F	F										
Intersection Summary												
Average Delay	1.2		ICU Level of Service		B							
Intersection Capacity Utilization	60.5%											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 4: Sycolin Rd/Sycolin Rd & Miller Dr
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔
Volume (veh/h)	31	273	314	1597	1	780	58
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.92	0.95	0.95
Hourly flow rate (vph)	33	287	331	1681	0	821	61
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							802
Upstream signal (ft)							
pX, platoon unblocked	0.90	0.90	0.90		0.00		
vC, conflicting volume	2323	411	882		0		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2244	111	637		0		
IC, single (s)	7.1	7.0	4.5		0.0		
IC, 2 stage (s)							
IF (s)	3.7	3.3	2.4		0.0		
p0 queue free %	0	65	55		0		
cM capacity (veh/h)	14	823	734		0		
Direction, Lane #							
Volume Total	33	287	331	841	841	411	61
Volume Left	33	0	331	0	0	0	0
Volume Right	0	287	0	0	0	0	61
cSH	14	823	734	1700	1700	1700	1700
Volume to Capacity	2.27	0.35	0.45	0.49	0.49	0.24	0.04
Queue Length 95th (ft)	121	39	59	0	0	0	0
Control Delay (s)	1123.9	11.7	13.9	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	125.1		2.3			0.0	
Approach LOS	F						
Intersection Summary							
Average Delay	13.9		ICU Level of Service		B		
Intersection Capacity Utilization	60.8%						
Analysis Period (min)	15						

HCM Signalized Intersection Capacity Analysis
 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	67	6	25	62	1	11	6	1428	119	23	700	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1781	1482		1694	1583	1687	3085	1468	1504	3505	1568	
Fit Permitted	0.71	1.00		0.70	1.00	0.29	1.00	1.00	0.11	1.00	1.00	
Satd. Flow (perm)	1330	1482		1242	1583	515	3085	1468	170	3505	1568	
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	70	6	26	65	1	11	6	1488	124	24	729	16
RTOR Reduction (vph)	0	0	19	0	0	8	0	0	52	0	0	7
Lane Group Flow (vph)	0	76	7	0	66	3	6	1488	72	24	729	9
Heavy Vehicles (%)	2%	2%	9%	7%	2%	2%	7%	17%	10%	20%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.0	28.0		28.0	28.0	60.4	60.4	60.4	61.3	60.4	60.4	60.4
Effective Green, g (s)	28.0	28.0		28.0	28.0	60.4	60.4	60.4	61.3	60.4	60.4	60.4
Actuated g/C Ratio	0.25	0.25		0.25	0.25	0.55	0.55	0.55	0.56	0.55	0.55	0.55
Clearance Time (s)	5.3	5.3		5.3	5.3	5.2	6.1	6.1	5.2	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	377		316	402	336	1693	806	155	1924	860	
v/s Ratio Prot						0.00	c0.48		0.01	c0.21		
v/s Ratio Perm	c0.06	0.00		0.05	0.00	0.01		0.05	0.08		0.01	0.01
v/c Ratio	0.22	0.02		0.21	0.01	0.02	0.88	0.09	0.15	0.38	0.01	0.01
Uniform Delay, d1	32.4	30.7		32.3	30.6	11.9	21.6	11.8	24.8	14.1	11.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.98	1.05	1.00	
Incremental Delay, d2	1.5	0.1		1.5	0.0	0.1	6.9	0.2	2.0	0.5	0.0	
Delay (s)	34.0	30.8		33.8	30.6	12.0	28.5	12.0	26.4	15.4	11.3	
Level of Service	C	C		C	C	B	C	B	C	B	B	
Approach Delay (s)	33.1			33.3			27.1			15.6		
Approach LOS	C			C			C			B		
Intersection Summary												
HCM 2000 Control Delay	24.1		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		16.6							
Intersection Capacity Utilization	61.7%		ICU Level of Service		B							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
 6: Sycolin Rd & Utility Facility Entr.
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	1	1	1541	1	1	753
Sign Control	Stop	Free	Free	Free	Free	Free
Grade	0%	0%	0%	0%	0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	1	1639	1	1	801
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)			None		None	
Median type						
Median storage (veh)						
Upstream signal (ft)			669		957	
pX, platoon unblocked	0.63	0.58			0.58	
vC, conflicting volume	2042	820			1640	
vC1, stage 1 conf vol					6	
vC2, stage 2 conf vol						
vCu, unblocked vol	668	0			643	
IC, single (s)	7.6	8.1			4.3	
IC, 2 stage (s)						
IF (s)	3.9	3.9			2.3	
p0 queue free %	99	100			100	
cM capacity (veh/h)	201	532			507	
Direction, Lane #						
Volume Total	1	1	820	820	1	401
Volume Left	1	0	0	0	1	0
Volume Right	0	1	0	0	1	0
cSH	201	532	1700	1700	507	1700
Volume to Capacity	0.01	0.00	0.48	0.48	0.00	0.24
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	23.0	11.8	0.0	0.0	0.0	12.1
Lane LOS	C	B			B	
Approach Delay (s)	17.4		0.0		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay	0.0					
Intersection Capacity Utilization	52.6%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Signalized Intersection Capacity Analysis
 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln
 2039 Horizon Year (Build)
 Timing Plan: PM PEAK HOUR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	8	1	23	6	4	22	18	1504	5	18	711	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6	6.1	5.6	6.1	5.6	6.1	5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fit Protected	0.96	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1257	1583		1808	1583	1543	2888		1770	3433		
Fit Permitted	0.87	1.00		0.91	1.00	0.31	1.00		0.07	1.00		
Satd. Flow (perm)	1145	1583		1702	1583	509	2888		125	3433		
Peak-hour factor, PHF	0.96	0.96		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1	24	6	4	23	19	1567	5	19	741	11
RTOR Reduction (vph)	0	0	18	0	0	17	0	0	0	1	0	0
Lane Group Flow (vph)	0	9	6	0	10	6	19	1572	0	19	751	0
Heavy Vehicles (%)	50%	2%	2%	2%	2%	2%	17%	25%	2%	2%	4%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4			8			5	2		1		6
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	28.0	28.0		28.0	28.0	64.7	59.7		64.7	59.7		
Effective Green, g (s)	28.0	28.0		28.0	28.0	64.7	59.7		64.7	59.7		
Actuated g/C Ratio	0.25	0.25		0.25	0.25	0.59	0.54		0.59	0.54		
Clearance Time (s)	5.6	5.6		5.6	5.6	6.1	5.6		6.1	5.6		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	291	402		433	402	346	1567		148	1863		
v/s Ratio Prot						0.00	c0.54		c0.01	0.22		
v/s Ratio Perm	c0.01	0.00		0.01	0.00	0.03			0.07			
v/c Ratio	0.03	0.02		0.02	0.01	0.05	1.00		0.13	0.40		
Uniform Delay, d1	30.8	30.7		30.7	30.7	9.8	25.1		16.1	14.7		
Progression Factor	1.00	1.00		1.00	1.00	0.68	0.31		1.00	1.00		
Incremental Delay, d2	0.2	0.1		0.1	0.1	0.2	17.8		1.8	0.7		
Delay (s)	31.0	30.8		30.8	30.7	6.8	25.7		17.9	15.4		
Level of Service	C	C		C	C	A	C		B	B		
Approach Delay (s)	30.8			30.8			25.4			15.4		
Approach LOS	C			C			C			B		
Intersection Summary												
HCM 2000 Control Delay	22.4		HCM 2000 Level of Service		C							
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	110.0		Sum of lost time (s)		17.3							
Intersection Capacity Utilization	64.1%		ICU Level of Service		C							
Analysis Period (min)	15											

Appendix J: Synchro™ Sim-Traffic Reports

Queuing and Blocking Report
2039 Horizon Year (Build)
AM PEAK HOUR

Intersection: 1: Sycolin Rd & Claudia Dr

Movement	WB	WB	NB	NB	SB	SB
Directions Served	LR	R	T	R	L	T
Maximum Queue (ft)	289	186	198	144	193	295
Average Queue (ft)	78	15	56	14	67	115
95th Queue (ft)	173	86	144	64	126	258
Link Distance (ft)	393		407		1173	1173
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		200		275		
Storage Blk Time (%)	1	0				
Queuing Penalty (veh)	0	0				

Intersection: 2: Sycolin Rd & Loudoun Center Pl

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (ft)	221	151	110	114	239	363	504
Average Queue (ft)	55	53	72	60	118	221	291
95th Queue (ft)	137	106	115	104	224	317	431
Link Distance (ft)	338	338	1173	1173		882	882
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)				371			
Storage Blk Time (%)					0		
Queuing Penalty (veh)					0		

Intersection: 3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	19	130	30	66
Average Queue (ft)	3	35	1	11
95th Queue (ft)	14	96	10	38
Link Distance (ft)	414	418		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			186	185
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
2039 Horizon Year (Build)
AM PEAK HOUR

Intersection: 4: Sycolin Rd/Sycolin Rd & Miller Dr

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	355	344	168
Average Queue (ft)	192	285	50
95th Queue (ft)	432	377	101
Link Distance (ft)	292	292	
Upstream Blk Time (%)	22	53	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)		296	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	71	26	139	42	45	110	118	14	28	135	166	197
Average Queue (ft)	10	3	63	12	12	31	42	1	3	52	47	10
95th Queue (ft)	40	15	120	30	32	79	101	8	16	127	124	69
Link Distance (ft)	430	430	338	338		723	723			616	616	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				296				228	279			179
Storage Blk Time (%)										0	0	
Queuing Penalty (veh)										0	0	

Intersection: 6: Sycolin Rd & Utility Facility Entr.

Movement	WB	SB
Directions Served	L	L
Maximum Queue (ft)	25	31
Average Queue (ft)	2	4
95th Queue (ft)	13	21
Link Distance (ft)	192	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	185	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
2039 Horizon Year (Build)
AM PEAK HOUR

Intersection: 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	44	62	29	52	51	143	167	225	415	334
Average Queue (ft)	2	23	3	13	9	78	78	22	262	230
95th Queue (ft)	16	49	18	42	33	150	157	88	357	313
Link Distance (ft)	409		485	485		904	904		777	777
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		275			290			200		
Storage Blk Time (%)									17	
Queuing Penalty (veh)									4	

Network Summary

Network wide Queuing Penalty: 5

Queuing and Blocking Report
2039 Horizon Year (Build)
PM PEAK HOUR

Intersection: 1: Sycolin Rd & Claudia Dr

Movement	WB	WB	NB	NB	SB	SB
Directions Served	LR	R	T	R	L	T
Maximum Queue (ft)	432	225	459	300	1189	1174
Average Queue (ft)	349	209	428	87	773	391
95th Queue (ft)	477	254	447	276	1237	1060
Link Distance (ft)	393		407		1173	1173
Upstream Blk Time (%)	22		34		6	5
Queuing Penalty (veh)	0		0		27	22
Storage Bay Dist (ft)		200		275		
Storage Blk Time (%)	56	13	32	0		
Queuing Penalty (veh)	76	22	33	1		

Intersection: 2: Sycolin Rd & Loudoun Center Pl

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (ft)	239	390	460	487	395	454	457
Average Queue (ft)	117	227	278	289	156	141	182
95th Queue (ft)	222	354	438	450	312	323	375
Link Distance (ft)	338	338	1173	1173		882	882
Upstream Blk Time (%)	3						
Queuing Penalty (veh)	0						
Storage Bay Dist (ft)					371		
Storage Blk Time (%)					1		
Queuing Penalty (veh)					2		

Intersection: 3: Sycolin Rd & Leesburg Airport Entr/County Facility Entr #1

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	20	41	29	29
Average Queue (ft)	9	10	8	3
95th Queue (ft)	24	32	29	18
Link Distance (ft)	414	418		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			186	185
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report
2039 Horizon Year (Build)
PM PEAK HOUR

Intersection: 4: Sycolin Rd/Sycolin Rd & Miller Dr

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	L	T	R
Maximum Queue (ft)	83	214	261	31	51
Average Queue (ft)	23	80	110	1	4
95th Queue (ft)	55	144	219	10	24
Link Distance (ft)	292	292		723	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			296		184
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Sycolin Rd/Sycolin Road & County Facility Entr #2/Tavistock Dr

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	116	74	131	21	24	364	358	253	98	288	287
Average Queue (ft)	42	16	49	7	3	191	205	22	31	159	168
95th Queue (ft)	85	50	102	21	14	317	337	95	86	268	275
Link Distance (ft)	430	430	338	338		723	723			616	616
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					296			228	279		179
Storage Blk Time (%)					1	5				0	8
Queuing Penalty (veh)					0	6				0	1

Intersection: 6: Sycolin Rd & Utility Facility Entr.

Movement	WB	WB
Directions Served	L	R
Maximum Queue (ft)	25	69
Average Queue (ft)	2	7
95th Queue (ft)	12	38
Link Distance (ft)	192	192
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
2039 Horizon Year (Build)
PM PEAK HOUR

Intersection: 7: Sycolin Rd & Tolbert Ln/ Tolbert Ln

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	73	41	51	52	52	366	403	47	199	184
Average Queue (ft)	7	8	13	9	8	158	135	12	146	102
95th Queue (ft)	34	27	39	32	31	296	290	37	207	186
Link Distance (ft)	409		485	485		904	904		777	777
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			275		290			200		
Storage Blk Time (%)						1		0		
Queuing Penalty (veh)						0		0		

Network Summary

Network wide Queuing Penalty: 191
