



**Traffic Impact Analysis
The Renaissance at Falmouth
Stafford County, Virginia**

**Prepared for:
S.L. Nusbaum Realty Co.**

June 1st, 2020

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Table of Contents

Executive Summary.....	5
Introduction	8
Background Information	8
Scope of Work.....	10
Existing Roadway Network	11
Existing Intersection Characteristics	12
Data Collection.....	14
Traffic Forecast and Background Traffic	14
Proposed Development (The Renaissance at Falmouth).....	15
Trip Generation.....	15
Capacity Analysis.....	16
Analysis of Existing Conditions (Year 2020)	17
Capacity Analysis Comparison – No Build vs. Build Conditions (Year 2025).....	19
US 17 Business and Glenalice Lane Queuing Analysis (Year 2025).....	25
Auxiliary Turn Lane Warrant Analysis	26
Conclusions	28

List of Tables

Table 1. Site Trip Generation Analysis.....	16
Table 2. HCM Level of Service Criteria.....	16
Table 3. Existing Conditions (2020) Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway	18
Table 4. Existing Conditions (2020) Capacity Analysis – US 17 Business and Glenalice Lane.....	18
Table 5. Existing Conditions (2020) Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane	19
Table 6. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway	20
Table 7. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway	21
Table 8. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Glenalice Lane	22
Table 9. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Glenalice Lane	23
Table 10. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane	24
Table 11. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane	25
Table 12. 2025 AM Peak Hour Queuing Analysis – US 17 Business and Glenalice Lane	26
Table 13. 2025 PM Peak Hour Queuing Analysis – US 17 Business and Glenalice Lane	26

List of Figures

Figure 1. Site location	8
Figure 2. Conceptual Plan	9
Figure 3. Site Access Points.....	10
Figure 4. US 17 Business and Olde Forge Drive/RV Parkway	12
Figure 5. US 17 Business and Glenalice Lane.....	13
Figure 6. US 17 Business and Solomon Drive/Lendall Lane.....	14
Figure 7. Right Turn Lane Evaluation Warrant at US 17 Business and Glenalice Lane	27

Appendices

Appendix A: Conceptual Plan

Appendix B: Approved Pre-Scope of Work Meeting Form

Appendix C: Approved Traffic Signal Plan at Warrenton Road and Olde Forge Drive/RV Parkway

Appendix D: 2018 Traffic Count Data

Appendix E: Traffic Volume and Traffic Distribution Exhibits

Appendix F: Background Development Traffic Volumes

Appendix G: Existing Conditions (2020) Capacity Analysis

Appendix H: No Build Conditions (2025) Capacity Analysis

Appendix I: Build Conditions (2025) Capacity Analysis

Appendix J: Queuing Analysis (2025) at US 17 Business and Glenalice Lane

Executive Summary

This report summarizes the findings of the Traffic Impact Analysis (TIA) performed by Bowman Consulting Group (BCG) for the proposed Development (Renaissance at Falmouth) located in Stafford County, Virginia.

The purpose of this study is to determine the potential impact (if any) to the existing traffic operations within the surrounding roadway network caused by the proposed development.

The proposed development is to be located on the northern side of US 17 Business (Warrenton Road) at the intersection with Glenalice Lane. The proposed development will consist of the following land uses:

- 264 Apartments
- 114 Single-Family Attached Units

A Pre-Scoping meeting was held with representatives from Stafford County and the Virginia Department of Transportation (VDOT) – Fredericksburg District at the VDOT Fredericksburg Residency on December 16, 2019. The purpose of this meeting was to discuss and agree upon major components of this study. During the meeting, items discussed included (but were not limited to) intersections to be analyzed, arrival/departure trip distribution, traffic growth factor, build out year, and background traffic.

Access to the site will be provided via the existing intersection of US 17 Business (Warrenton Road) and Glenalice Lane.

The Renaissance at Falmouth Development is expected to generate 143 trips (35 in and 108 out) during the morning peak hour and 178 trips (109 in and 69 out) during the evening peak hour.

The following intersections were evaluated in this study:

- US 17 Business and Olde Forge Drive/RV Parkway
- US 17 Business and Glenalice Lane
- US 17 Business and Solomon Drive/Lendall Lane

For the purposes of this analysis, it is anticipated that The Renaissance at Falmouth Development will be constructed and fully operational by year 2025. The following scenarios were evaluated as part of this study:

- Existing Conditions (2020)
- Future Conditions (2025) without the proposed development (No Build)
- Future Conditions (2025) with the proposed development (Build)

The capacity analysis results indicate the following:

- At US 17 Business and Olde Forge Drive/RV Parkway, the overall intersection level of service ("C" during the morning peak hour and "D" during the evening peak hour) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 0.3 seconds during the morning peak hour and 3.4 seconds during the evening peak hour with the addition of the proposed development's site traffic. The levels of service for all turning movements and approaches are not projected to change from No Build to Build Conditions.
- At US 17 Business and Glenalice Lane, the overall intersection level of service ("A" during the morning and evening peak hours) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 1.5 seconds during the morning peak hour and 1.3 seconds during the evening peak hour with the addition of the proposed development's site traffic. The southbound approach is projected to degrade under Build Conditions from a LOS D during the morning and evening peak hours to a LOS E during the morning peak hour and a LOS F during the evening peak hour.
 - The southbound approach is anticipated to only serve the proposed development, and these conditions are typical for left-turning traffic entering a major corridor from a minor street at an unsignalized intersection. The traffic signals at US 17 Business/Olde Forge Dr/RV Pkwy and US 17 Business/Solomon Dr/Lendall Ln could potentially be used as a metering system to improve the levels of service for this approach by creating gaps along the mainline traffic.
 - An additional solution to improve queuing at the southbound approach could be to re-stripe the intersection to allow southbound vehicles to perform a two-stage left turn to exit Glenalice Lane onto US 17 Business. A two-stage left turn at this location would allow exiting vehicles to wait for westbound traffic to clear, then maneuver into the center lane of US 17 Business, and then wait for eastbound traffic to clear before merging into the traffic stream.

The existing two-way left turn lane along US 17 Business at this location could be re-striped to accommodate this layout. Therefore, additional right-of-way would not be required. Additionally, delineators could be installed to enhance safety and driver expectation at this location.

- At US 17 Business and Solomon Drive/Lendall Lane, the overall intersection level of service ("C" during the morning and evening peak hours) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 0.4 seconds during the morning peak hour and 0.7 seconds during the evening peak hour with the addition of the proposed development's site traffic. The levels of service for all turning movements and approaches are not projected to change from No Build to Build Conditions.
- Queuing analyses were conducted under the 2025 Build Conditions with a two-stage left turn in place at US 17 Business and Glenalice Lane. The results of the queuing analyses indicate that the projected southbound queue at this location would be reduced from Build Conditions by 266 feet during the morning peak hour and 36 feet during the evening peak hour.

Based on coordination with VDOT, there are planned improvements at the I-95 and Warrenton Road interchange, including a proposed traffic signal at the exit ramps. These improvements would require traffic signal retiming at several locations along the US 17 Business corridor, including the study intersections evaluated in this report. These timing changes should help facilitate traffic operations throughout the US 17 Business corridor.

The results of the right turn lane warrant analysis indicate that the installation of a westbound right turn taper from US 17 Business onto Glenalice Lane is warranted during both the morning and evening peak periods under full build out of the proposed development.

The capacity analysis results indicate that the addition of the site traffic associated with the proposed development is not expected to adversely impact the existing roadway network.

Introduction

This report summarizes the findings of the Traffic Impact Analysis (TIA) performed by Bowman Consulting Group (BCG) for the proposed Renaissance at Falmouth development located in Stafford County, Virginia. The purpose of this study is to determine the potential impact (if any) to the existing traffic operations within the surrounding roadway network caused by the proposed development.

Background Information

The proposed development is to be located on the northern side of US 17 Business at the intersection with Glenalice Lane. **Figure 1** depicts the site location.



Figure 1. Site location.

The Renaissance at Falmouth development will consist of 264 apartments and 114 single-family attached units. The conceptual plan is depicted in **Figure 2** and in **Appendix A**.

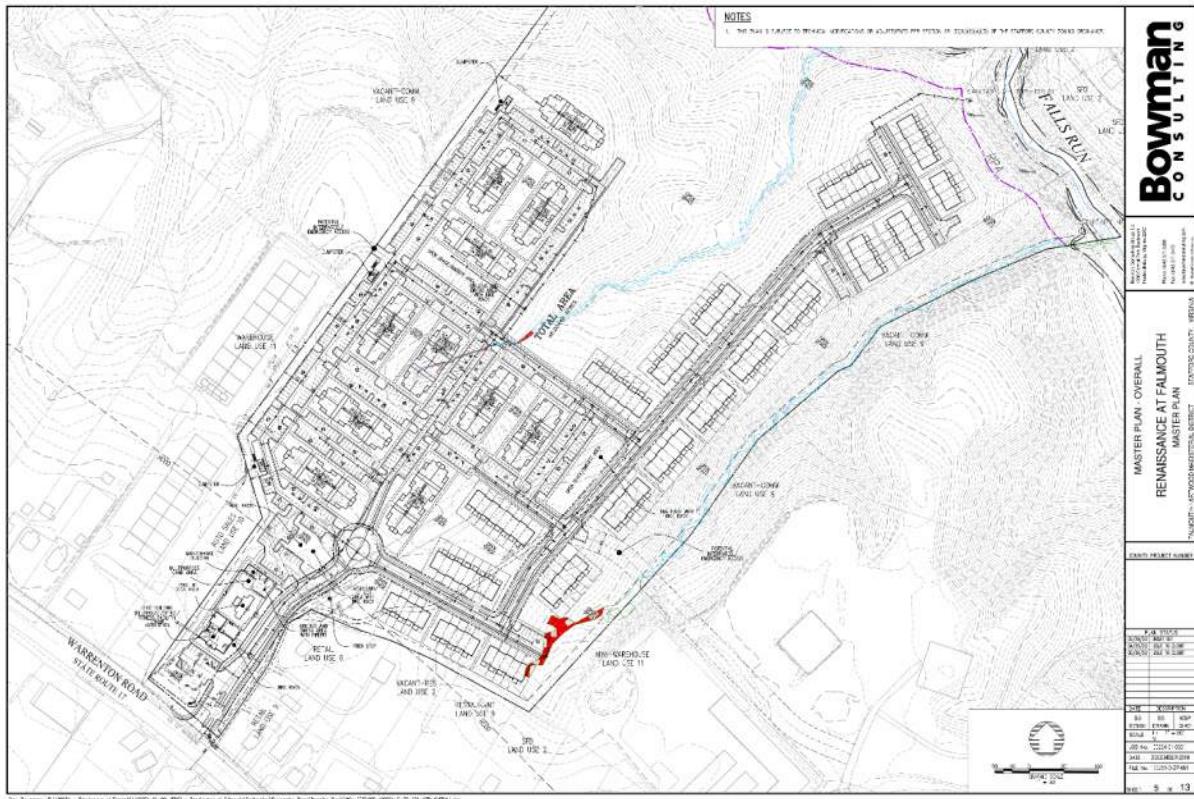


Figure 2. Conceptual Plan

Access to the development will be provided via the existing intersection of US 17 Business and Glenalice Lane. **Figure 3** depicts the access point for the proposed site.



Figure 3. Site Access Points

Scope of Work

A Pre-Scoping meeting was held with representatives from Stafford County and the Virginia Department of Transportation (VDOT) – Fredericksburg District at the VDOT Fredericksburg Residency on December 16, 2019. The purpose of this meeting was to discuss and agree upon major components of this study. The signed pre-scope of work form is contained in **Appendix B** of this report.

During the meeting, items such as intersections to be analyzed, arrival/departure trip distribution, traffic growth factor, build out year, and background traffic were discussed. Some of the items discussed and agreed upon by all parties are listed below:

Data Collection

- Traffic data for the study area was extracted from the approved Rappahannock Landing Apartments TIA prepared by BCG in March, 2018. This data was grown to year 2020 and used in the analysis for the proposed Renaissance at Falmouth development.
- Synchro network for the study area was extracted from the approved Rappahannock Landing Apartments TIA prepared by BCG in March, 2018. This Synchro network was provided by VDOT and contains existing traffic signal and clearance timings.
 - The intersection of US 17 Business and Olde Forge Drive/RV Parkway was not yet signalized at the time the Synchro network was provided. BCG revised the intersection to signalized conditions to match the approved traffic signal plans.

Study Periods

- Existing Conditions (2020)
- Future Conditions (2025) without the proposed development (No Build)
- Future Conditions (2025) with the proposed development (Build)

Intersections to be Evaluated

- US 17 Business and Olde Forge Drive/RV Parkway (Signalized)
- US 17 Business and Glenalice Lane (Unsignalized)
- US 17 Business and Solomon Drive/Lendall Lane (Signalized)

Additional Information

- The construction of a permanent traffic signal has been approved at the intersection of US 17 Business and Olde Forge Drive/RV Parkway. This traffic signal should be included in all analysis study periods.
- VDOT has planned improvements at the I-95 and Warrenton Road interchange, including a proposed traffic signal at the exit ramps. This project should include signal retiming at several locations along US 17 Business, including the study intersections included in this report.

Existing Roadway Network

US 17 Business (Warrenton Road) within the identified study area is a four-lane undivided roadway with a mix of auxiliary lanes and a center two-way left turn lane. US 17 Business is identified as a principal arterial on VDOT's 2014 Functional Classification Map. It has an east-west alignment within the study area with a posted speed limit of 45 miles per hour.

Olde Forge Drive (Route 1580) within the identified study area is a two-lane undivided roadway identified as a local street on VDOT's 2014 Functional Classification Map. It has a north-south alignment with a posted speed limit of 25 miles per hour.

RV Parkway (Route 698) within the identified study area is a two-lane undivided roadway identified as a local street on VDOT's 2014 Functional Classification Map. It has a north-south alignment with a posted speed limit of 25 miles per hour.

Glenalice Lane within the identified study area is a two-lane undivided roadway identified as a local street on VDOT's 2014 Functional Classification Map. It has a north-south alignment with a posted speed limit of 25 miles per hour.

Solomon Drive (Route 1001) within the identified study area is a two-lane undivided roadway identified as a local street on VDOT's 2014 Functional Classification Map. It has a north-south alignment with no posted speed limit.

Lendall Lane (Route 1015) within the identified study area is a two-lane undivided roadway identified as a local street on VDOT's 2014 Functional Classification Map. It has a north-south alignment with a posted speed limit of 30 miles per hour.

Existing Intersection Characteristics

Intersection of US 17 Business (Warrenton Road) and Olde Forge Drive/RV Parkway.

This intersection is currently two offset unsignalized intersections (US 17 Business/Olde Forge Drive and US 17 Business/RV Parkway) that are expected to operate as one intersection after the implementation of a traffic signal. US 17 Business has an east-west alignment and Olde Forge Drive/RV Parkway has a north-south alignment as shown in **Figure 4**.

The construction of a permanent traffic signal has been approved at this location. For the purposes of the analysis contained in this report, the traffic signal at this location has been included in all analysis study periods. The approved traffic signal plan at this location is contained in **Appendix C** of this report.



Figure 4. US 17 Business and Olde Forge Drive/RV Parkway

Upon signalization, the eastbound approach will consist of an exclusive left turn lane, a through lane, and a shared through/right turn lane. The westbound approach will consist of an exclusive left turn lane, a through lane, and a shared through/right turn lane. The northbound approach will consist of an exclusive left turn lane and a shared left turn/through/right turn lane. The southbound approach will consist of a shared left turn/through/right turn lane.

Intersection of US 17 Business and Glenalice Lane

This intersection is currently a three-legged unsignalized intersection where US 17 Business has an east-west alignment and Glenalice Lane has a north-south alignment as shown in **Figure 5**.



Figure 5. US 17 Business and Glenalice Lane

The eastbound approach consists of a center two-way left turn lane and two through lanes. The westbound approach consists of a through lane and a shared through/right turn lane. The southbound approach consists of a shared left turn/right turn lane and is currently controlled by a stop sign.

Intersection of US 17 Business and Solomon Drive/Lendall Lane

This intersection is currently a four-legged signalized intersection where US 17 Business has an east-west alignment and Solomon Drive/Lendall Lane has a north-south alignment as shown in **Figure 6**.



Figure 6. US 17 Business and Solomon Drive/Lendall Lane

The eastbound and westbound approaches consist of an exclusive left turn lane, two through lanes, and an exclusive right turn lane. The northbound approach consists of a shared left turn/through/right turn lane. The southbound approach consists of an exclusive left turn lane, a through lane, and an exclusive right turn lane.

Data Collection

Field inspections were conducted to obtain an inventory of existing roadway geometry, traffic control devices, and location of adjacent intersections.

As previously mentioned, traffic data for the study area was extracted from the approved Rappahannock Landing Apartments TIA prepared by BCG in March of 2018. The traffic counts are included in **Appendix D** of this report.

Traffic Forecast and Background Traffic

For the purposes of this analysis, it is anticipated that The Renaissance at Falmouth Development will be constructed and fully operational by year 2025. The following scenarios were evaluated as part of this study:

- Existing Conditions (2020)
- Future Conditions (2025) without the proposed development (No Build)
- Future Conditions (2025) with the proposed development (Build)

The 2018 traffic volumes from the Rappahannock Landing Apartments TIA are depicted on **Exhibit 1** in **Appendix E**. These traffic volumes were grown to 2020 using a 2.0% growth rate. The 2020 Existing Traffic Volumes are depicted on **Exhibit 2 in Appendix E**.

The 2020 traffic volumes were then projected an additional five (5) years to the 2025 Background Traffic Volumes using the 2.0% growth rate. The 2025 Background Traffic Volumes are depicted on **Exhibit 3 in Appendix E**.

During the Pre-Scope meeting with VDOT and Stafford County, three (3) projects were identified to have been approved since the completion of the Rappahannock Landing Apartments TIA, and therefore should be included in the analysis. The projects discussed are as follows:

- Rappahannock Landing Sections 2-4
- Cherryview Landing
- Dunkin Donuts

The traffic volume projection figures were extracted from these approved studies and are contained in **Appendix F** of this report for informational purposes.

The Total Background Development Traffic Volumes for use in this study are depicted on **Exhibit 4 in Appendix E**.

There is currently vehicular traffic accessing Glenalice Lane that will be removed from the roadway network upon construction of The Renaissance at Falmouth Development. These traffic volumes are depicted on **Exhibit 5 in Appendix E**.

The existing Glenalice Lane Traffic Volumes were subtracted, and the Total Background Development Traffic Volumes were added to the 2025 Background Traffic Volumes to create the 2025 No Build Traffic Volumes, which are depicted on **Exhibit 6 in Appendix E**.

Proposed Development (The Renaissance at Falmouth)

The applicant is proposing to develop the site with a mix of residential land uses. The proposed development will consist of the following land uses:

- 264 Apartments
- 114 Single-Family Attached Units

Trip Generation

The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition* was used to determine the number of trips generated by the proposed land uses. **Table 1** displays the trip generation for the proposed land uses and includes the morning peak hour, evening peak hour, and daily trips.

Table 1. Site Trip Generation Analysis

Land Use ⁽¹⁾	Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour			Weekday		
				In	Out	Total	In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise)	220	114	D.U.	12	42	54	41	25	66	410	411	821
Multifamily Housing (Mid-Rise)	221	264	D.U.	23	66	89	68	44	112	718	719	1437
Total, Average Weekday	--	--	--	35	108	143	109	69	178	1128	1130	2258

These traffic volumes were then distributed to the roadway system in accordance with a site traffic distribution pattern agreed upon at the Pre-Scope meeting with VDOT and Stafford County. The site distribution is depicted on **Exhibit 7 in Appendix E**. The projected site trips were applied to the trip distribution, and are depicted on **Exhibit 8 in Appendix E**.

The projected site trips were then added to the 2025 No Build Traffic Volumes to create the 2025 Build Traffic Volumes. The 2025 Build Traffic Volumes are depicted on **Exhibit 9 in Appendix E**.

Capacity Analysis

The study intersections were analyzed for each scenario using the 2010 Edition of the Highway Capacity Manual (HCM) methodologies using the computer software package Synchro 10 with SimTraffic. The analysis uses capacity, Level of Service (LOS), control delay, and queuing as the criteria for the performance of the intersections.

Capacity, as defined by the HCM, is a measure of the maximum number of vehicles in an hour that can travel through an intersection or section of roadway under typical conditions. Level of Service (LOS) is a marker of the driving conditions and perception of drivers while traveling during the given time period. LOS ranges from LOS "A" which represents free flow conditions, to LOS "F" which represents breakdown conditions. **Table 2** shows the LOS for intersections as defined by the HCM.

Table 2. HCM Level of Service Criteria

Unsignalized Intersections		Signalized Intersections	
Level of Service	Average Control Delay (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤10	A	≤10
B	>10 and ≤15	B	>10 and ≤20
C	>15 and ≤25	C	>20 and ≤35
D	>25 and ≤35	D	>35 and ≤55
E	>35 and ≤50	E	>55 and ≤80
F	>50	F	>80

Typically, LOS "A" through "D" is considered acceptable, while LOS "E" and "F" are considered failing or unacceptable. Control delay is a measure of the total amount of delay experienced by an individual vehicle and includes delay related to deceleration, queue delay, stopped delay, and acceleration. **Table 2** shows the amount of control delay (in seconds per vehicle) that corresponds to the LOS for signalized and unsignalized intersections.

The reported queues, or linear distance of delayed vehicles, for the intersection in this study are the maximum queues reported by SimTraffic after 10 runs of 60 minutes each with a 15-minute seeding time (in accordance with the Traffic Operations and Safety Analysis Manual (TOSAM) – Version 1.0). They are reported to ensure that the storage lengths of lanes at intersections are of adequate length and that queued vehicles will not interfere with free flow vehicles or adjacent intersections.

Capacity analyses were completed for the following scenarios for the morning and evening peak hours:

- Existing Conditions (2020)
- No Build Conditions (2025) without The Renaissance at Falmouth
- Build Conditions (2025) with The Renaissance at Falmouth

Analysis of Existing Conditions (Year 2020)

A capacity analysis was conducted for the study intersections previously described in this report. This capacity analysis is based on traffic volumes, lane configurations, and intersection configurations. The capacity analysis results are included in **Appendix G**.

Intersection of US 17 Business and Olde Forge Drive/RV Parkway

Based on the results of the capacity analysis under 2020 Existing Conditions, the intersection of US 17 Business and Olde Forge Drive/RV Parkway is expected to experience an acceptable overall level of service “C” during the morning and evening peak hours.

During the morning peak hour, the northbound through/right turn movement is expected to operate at a LOS E. All other turning movements and approaches are expected to operate at a LOS D or better during the morning peak hour.

During the evening peak hour, the northbound through/right turn movement is expected to operate at a LOS E. All other turning movements and approaches are expected to operate at a LOS D or better during the evening peak hour.

The capacity results are summarized in **Table 3**.

Table 3. Existing Conditions (2020) Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway

INTERSECTION			AM Peak			PM Peak		
			Conditions			Conditions		
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #1: US 17 Business & Olde Forge Drive/RV Parkway (2020 Existing Conditions)	EB	L	0.0	A	0	0.0	A	0
		T	30.9	C	427	32.0	C	617
		R	30.5	C	421	31.9	C	607
		Approach	30.7	C	--	31.9	C	--
	WB	L	31.7	C	62	40.8	D	190
		TR	5.1	A	371	4.7	A	324
		Approach	5.8	A	--	6.5	A	348
	NB	L	44.0	D	132	43.9	D	147
		TR	62.7	E	115	62.1	E	123
		Approach	54.3	D	--	53.9	D	--
	SB	Approach	0.0	A	0	0.0	A	0
OVERALL			20.1	C	--	22.7	C	--

*Extracted from SimTraffic simulation software

During the morning peak hour, the queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

During the evening peak hour, the westbound left turn queue (150 ft storage) is expected to exceed the available storage for the auxiliary lane. However, the left turn lane currently backs up to a two-way left turn lane (TWTL), which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

Intersection of US 17 Business and Glenalice Lane

Based on the results of the capacity analysis, the intersection of US 17 Business and Glenalice Lane is expected to experience an acceptable overall level of service “A” during the morning and evening peak hours.

During the morning and evening peak hours, all turning movements and approaches are expected to operate at a LOS D or better.

The capacity results are summarized in **Table 4.**

Table 4. Existing Conditions (2020) Capacity Analysis – US 17 Business and Glenalice Lane

INTERSECTION			AM Peak			PM Peak		
			Conditions			Conditions		
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #2: US 17 Business & Glenalice Lane (2020 Existing Conditions)	EB	L	13.9	B	1	13.2	B	27
		T	0.0	A	0	0.0	A	0
		Approach	0.0	A	--	0.0	A	--
	SB	Approach	27.6	D	36	26.6	D	28
	OVERALL		0.1	A	--	0.0	A	--

*Extracted from SimTraffic simulation software

During the morning and evening peak hours, the queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

Intersection of US 17 Business and Solomon Drive/Lendall Lane

Based on the results of the capacity analysis, the intersection of US 17 Business and Solomon Drive/Lendall Lane is expected to experience an acceptable overall level of service “C” during the morning and evening peak hours.

During the morning and evening peak hours, all turning movements and approaches are expected to operate at a LOS D or better.

The capacity results are summarized in **Table 5**.

Table 5. Existing Conditions (2020) Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane

INTERSECTION			AM Peak			PM Peak		
			Conditions			Conditions		
			Approach	Movement	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)
Intersection #3: US 17 Business & Solomon Drive/Lendall Lane (2020 Existing Conditions)	EB	L	16.2	B	124	10.9	B	106
		T	17.0	B	211	30.3	C	298
		R	8.9	A	61	8.2	A	70
		Approach	16.8	B	--	29.6	C	--
	WB	L	11.4	B	106	20.8	C	31
		T	20.6	C	372	16.9	B	286
		R	10.3	B	122	9.1	A	6
		Approach	20.1	C	--	16.8	B	--
	NB	Approach	46.2	D	134	45.6	D	149
	SB	L	42.8	D	108	44.8	D	91
		T	40.5	D	36	42.3	D	34
		R	44.6	D	86	44.5	D	59
		Approach	43.7	D	--	44.5	D	--
OVERALL			20.2	C	--	25.6	C	--

*Extracted from SimTraffic simulation software

During the morning peak hour, the eastbound left turn queue (50 ft storage) and the westbound left turn movement (95 ft storage) are expected to exceed the available storage for the auxiliary lanes.

During the evening peak hour, the eastbound left turn queue (50 ft storage) is expected to exceed the available storage for the auxiliary lanes.

The eastbound and westbound left turn lanes each back up to a TWLTL, which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

Capacity Analysis Comparison – No Build vs. Build Conditions (Year 2025)

Capacity analyses were conducted for the No Build and Build Conditions for the proposed year 2025. The primary purpose for this approach was to compare the results in order to identify areas impacted by the proposed development. The capacity analysis results are included in **Appendices H and I**.

Intersection of US 17 Business and Olde Forge Drive/RV Parkway

Based on the results of the capacity analysis during the morning peak hour, the intersection of US 17 Business and Olde Forge Drive/RV Parkway is projected to operate at an overall level of service “C” during both the No Build and Build Conditions, with an increase in overall delay of only 0.3 seconds.

The northbound through/right turn movement and northbound approach are projected to operate at a LOS E during both the No Build and Build Conditions, with no projected increase in delay from the No Build to the Build Conditions.

All other turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions. There are no projected changes in levels of service from the No Build to the Build Conditions.

The westbound left turn queue (150 ft storage) is projected to exceed the available storage length for the auxiliary lane during both the No Build and Build Conditions, with a decrease in projected queue length of 20 feet during the Build Conditions. However, the left turn lane currently backs up to a TWLTL, which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 6**.

Table 6. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway

INTERSECTION			AM Peak (No Build)			AM Peak (Build)		
			Conditions			Conditions		
Intersection #1: US 17 Business & Olde Forge Drive/RV Parkway (2025 AM No Build vs. Build Conditions)	Approach	Movement	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
	EB	L	0.0	A	0	0.0	A	0
		T	33.6	C	646	34.3	C	658
		R	33.9	C	642	34.7	C	641
		Approach	33.7	C	--	34.5	C	--
	WB	L	41.3	D	283	41.6	D	263
		TR	9.2	A	536	9.8	A	649
		Approach	10.4	B	--	10.9	B	--
	NB	L	43.2	D	201	43.2	D	196
		TR	76.9	E	183	76.9	E	182
		Approach	61.7	E	--	61.7	E	--
	SB	Approach	0.0	A	0	0.0	A	0
	OVERALL		26.1	C	--	26.4	C	--

*Extracted from SimTraffic simulation software

Based on the results of the capacity analysis during the evening peak hour, the intersection of US 17 Business and Olde Forge Drive/RV Parkway is projected to operate at an overall level of service “D” during both the No Build and Build Conditions, with an increase in overall delay of 3.4 seconds.

The northbound left turn movement, northbound through/right turn movement, and northbound approach are projected to operate at a LOS F during both the No Build and Build Conditions, with no projected increase in delay from the No Build to the Build Conditions. The westbound left turn movement

is projected to operate at a LOS E during both the No Build and Build Conditions, with an increase in delay of 0.4 seconds from the No Build to the Build Conditions.

All other turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions. There are no projected changes in levels of service from the No Build to the Build Conditions.

The westbound left turn queue (150 ft storage) is projected to exceed the available storage length for the auxiliary lane during both the No Build and Build Conditions, with an increase in projected queue length of 23 feet during the Build Conditions. However, the left turn lane currently backs up to a TWLTL, which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 7**.

Table 7. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Olde Forge Drive/RV Parkway

INTERSECTION			PM Peak (No Build)			PM Peak (Build)		
			Conditions			Conditions		
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #1: US 17 Business & Olde Forge Drive/RV Parkway (2025 PM No Build vs. Build Conditions)	EB	Approach	L	0.0	A	0	0.0	A
			T	41.3	D	765	47.5	D
			R	44.9	D	777	52.2	D
		Approach	Approach	43.2	D	--	49.9	D
	WB		L	69.3	E	253	69.7	E
			TR	4.9	A	333	5.1	A
		Approach	Approach	9.7	A	--	9.7	A
	NB		L	102.5	F	242	102.5	F
			TR	223.6	F	238	223.6	F
		Approach	Approach	168.5	F	--	168.5	F
	SB	Approach	OVERALL	0.0	A	--	0.0	A
				39.6	D	--	43.0	D
								--

*Extracted from SimTraffic simulation software

Intersection of US 17 Business and Glenalice Lane

Based on the results of the capacity analysis during the morning peak hour, the intersection of US 17 Business and Glenalice Lane is projected to operate at an overall level of service “A” during both the No Build and Build Conditions, with an increase in overall delay of only 1.5 seconds.

The eastbound approach is projected to operate at a LOS A during both the No Build and Build Conditions, with minimal increases in delay and no changes in level of service.

The southbound approach is anticipated to only serve the proposed development, and these conditions are typical for left-turning traffic entering a major corridor from a minor street at an unsignalized intersection. The traffic signals at US 17 Business/Olde Forge Dr/RV Pkwy and US 17 Business/Solomon Dr/Lendall Ln could potentially be used as a metering system to improve the levels of service for this approach by creating potential gaps in the mainline traffic.

These conditions are typical for left-turning traffic entering a major corridor from a minor street at an unsignalized intersection. The traffic signals at US 17 Business/Olde Forge Dr/RV Pkwy and US 17 Business/Solomon Dr/Lendall Ln could potentially be used as a metering system to improve the levels of service for this approach by producing gaps in the mainline traffic.

The queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 8**.

Table 8. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Glenalice Lane

INTERSECTION			AM Peak (No Build)			AM Peak (Build)		
			Conditions			Conditions		
Intersection #2: US 17 Business & Glenalice Lane (2025 AM No Build vs. Build Conditions)	Approach	Movement	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
	EB	L	15.7	C	11	16.7	C	52
		T	0.0	A	5	0.0	A	92
		Approach	0.0	A	--	0.2	A	--
	SB	L				96.3	F	370
		R				22.8	C	342
		Approach	34.2	D	40	48.7	E	--
	OVERALL		0.1	A	--	1.6	A	--

*Extracted from SimTraffic simulation software

Based on the results of the capacity analysis during the evening peak hour, the intersection of US 17 Business and Glenalice Lane is projected to operate at an overall level of service “A” during both the No Build and Build Conditions, with an increase in overall delay of only 1.3 seconds.

The eastbound approach is projected to operate at a LOS A during both the No Build and Build Conditions. The eastbound left turn movement is projected to degrade from a LOS B during the No Build Conditions to a LOS C during the Build Conditions, with an increase in delay of only 3.1 seconds.

The southbound approach is projected to degrade from a LOS D during the No Build Conditions to a LOS F during the Build Conditions, with an increase in delay of 19.0 seconds. Additionally, the southbound left turn movement is projected to operate at a LOS F during the Build Conditions.

The southbound approach is anticipated to only serve the proposed development, and these conditions are typical for left-turning traffic entering a major corridor from a minor street at an unsignalized intersection. The traffic signals at US 17 Business/Olde Forge Dr/RV Pkwy and US 17 Business/Solomon Dr/Lendall Ln could potentially be used as a metering system to improve the levels of service for this approach by creating potential gaps in the mainline traffic.

The queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 9**.

Table 9. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Glenalice Lane

INTERSECTION			PM Peak (No Build)			PM Peak (Build)		
			Conditions			Conditions		
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #2: US 17 Business & Glenalice Lane (2025 PM No Build vs. Build Conditions)	EB	Movement	L	14.9	B	21	18.0	C 101
			T	0.0	A	0	0.0	A 81
		Approach	Approach	0.0	A	--	0.6	A --
	SB		L				110.3	F 113
			R				19.9	C 77
		Approach	Approach	32.3	D	20	51.3	F --
			OVERALL	0.0	A	--	1.3	A --

*Extracted from SimTraffic simulation software

As shown in **Tables 8** and **9**, capacity constraints for the southbound approach are projected at this intersection under Build Conditions. Most notably, the southbound approach during the morning peak hour is projected to experience queues of over 350 feet.

It was previously mentioned that the signalized intersections to the east and west of Glenalice Lane could potentially be used as a metering system to improve the levels of service for this approach by producing gaps in the mainline traffic.

An additional solution to improve queuing at this approach could be to re-stripe the intersection to allow southbound vehicles to perform a two-stage left turn to exit Glenalice Lane onto US 17 Business. A two-stage left turn at this location would allow exiting vehicles to wait for westbound traffic to clear, then maneuver into the center lane of US 17 Business, and then wait for eastbound traffic to clear before merging into the traffic stream.

The existing two-way left turn lane along US 17 Business at this location could be re-striped to accommodate this layout, so no additional right-of-way would be required. Additionally, delineators could be installed to enhance safety and driver expectation at this location.

Intersection of US 17 Business and Solomon Drive/Lendall Lane

Based on the results of the capacity analysis during the morning peak hour, the intersection of US 17 Business and Solomon Drive/Lendall Lane is projected to operate at an overall level of service “C” during both the No Build and Build Conditions, with an increase in overall delay of only 0.4 seconds.

All turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions, with no projected changes in levels of service.

The eastbound left turn queue (115 ft storage) is projected to exceed the available storage length for the auxiliary lane during both the No Build and Build Conditions, with minimal increase in projected queue length of 1 foot during the Build Conditions. However, the left turn lane currently backs up to a TWLTL, which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 10**.

Table 10. 2025 AM Peak Hour Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane

INTERSECTION			AM Peak (No Build)			AM Peak (Build)		
			Conditions			Conditions		
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #3: US 17 Business & Solomon Drive/Lendall Lane (2025 AM No Build vs. Build Conditions)	EB	Approach	L	24.0	C	158	24.3	C
			T	18.3	B	240	19.0	B
			R	8.4	A	66	8.4	A
		Approach	Approach	18.7	B	--	19.3	B
	WB		L	12.8	B	100	13.4	B
			T	24.1	C	436	24.5	C
			R	10.0	A	255	10.0	A
		Approach	Approach	23.6	C	--	23.9	C
	NB	Approach	Approach	52.5	D	145	52.5	D
			L	51.8	D	140	51.8	D
			T	40.7	D	79	40.7	D
			R	47.7	D	123	47.7	D
	SB	Approach	Approach	49.7	D	--	49.7	D
			L	49.7	D	--	49.7	D
			T	40.7	D	79	40.7	D
			R	47.7	D	123	47.7	D
OVERALL			23.4	C	--	23.8	C	--

*Extracted from SimTraffic simulation software

Based on the results of the capacity analysis during the evening peak hour, the intersection of US 17 Business and Solomon Drive/Lendall Lane is projected to operate at an overall level of service “C” during both the No Build and Build Conditions, with an increase in overall delay of only 0.7 seconds.

The southbound left turn movement is projected to operate at a LOS F during both the No Build and Build Conditions, with no projected increase in delay from the No Build to the Build Conditions. The northbound approach, southbound through movement, southbound right turn movement, and southbound approach are projected to operate at a LOS E during both the No Build and Build Conditions, with no projected increase in delay from the No Build to the Build Conditions.

All other turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions. There are no projected changes in levels of service from the No Build to the Build Conditions.

The eastbound left turn queue (115 ft storage) is projected to exceed the available storage length for the auxiliary lane during both the No Build and Build Conditions, with a decrease in projected queue length of 18 feet during the Build Conditions. However, the left turn lane currently backs up to a TWLTL, which can provide additional storage for left-turning vehicles, if necessary, without impacting through traffic along US 17 Business. All other queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes.

The capacity results are summarized in **Table 11**.

Table 11. 2025 PM Peak Hour Capacity Analysis – US 17 Business and Solomon Drive/Lendall Lane

INTERSECTION			PM Peak (No Build)			PM Peak (Build)			
			Conditions			Conditions			
			DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*	
Intersection #3: US 17 Business & Solomon Drive/Lendall Lane (2025 PM No Build vs. Build Conditions)	EB	Approach	L	13.6	B	184	14.5	B	166
		T	26.0	C	555	27.1	C	500	
		R	7.3	A	69	7.3	A	63	
		Approach	25.4	C	--	26.5	C	--	
	WB	L	27.9	C	46	29.5	C	43	
		T	16.6	B	368	17.1	B	391	
		R	8.3	A	33	8.3	A	87	
		Approach	16.6	B	--	17.0	B	--	
	NB	Approach	79.1	E	215	79.1	E	195	
		L	80.9	F	138	80.9	F	139	
		T	69.4	E	95	69.4	E	131	
		R	73.2	E	106	73.2	E	105	
	SB	Approach	77.6	E	--	77.6	E	--	
		OVERALL	25.0	C	--	25.7	C	--	

*Extracted from SimTraffic simulation software

US 17 Business and Glenalice Lane Queuing Analysis (Year 2025)

As previously mentioned, capacity constraints for the southbound approach at the intersection of US 17 Business and Glenalice Lane are projected under Build Conditions. Most notably, the southbound approach during the morning peak hour is projected to experience queues of over 350 feet.

A solution to improve queuing at this approach could be to re-stripe the intersection to allow southbound vehicles to perform a two-stage left turn to exit Glenalice Lane onto US 17 Business. A two-stage left turn at this location would allow exiting vehicles to wait for westbound traffic to clear, then maneuver into the center lane of US 17 Business, and then wait for eastbound traffic to clear before merging into the traffic stream.

Traffic simulation queuing analyses were conducted under the two-stage left turn conditions for the proposed year 2025.

The results of the queuing analysis were compared with the reported queues from the 2025 No Build and Build Conditions to identify if the restriping would alleviate the capacity constraints projected for the southbound approach. The queuing analysis results are included in **Appendix J**.

Based on the results of the queuing analysis during the morning peak hour, the southbound approach is projected to have a maximum queue length of 104 feet under the two-stage left turn conditions (with receiving lane). The queue is not projected to exceed the available storage of the exiting approach and represents a reduction in queue length of 266 feet from Build Conditions. The queuing analysis results are summarized in **Table 12**.

Table 12. 2025 AM Peak Hour Queuing Analysis – US 17 Business and Glenalice Lane

INTERSECTION		AM Peak (No Build)		AM Peak (Build)	AM Peak (Build w Receiving Lane)
		Conditions	Conditions	Conditions	Conditions
		Maximum Queue (ft)*	Maximum Queue (ft)*	Maximum Queue (ft)*	Maximum Queue (ft)*
Intersection #2: US 17 Business & Glenalice Lane (2025 AM No Build vs. Build w Receiving Lane Conditions)	Approach	Movement			
		L		370	82
	SB	R		342	104
		Approach	40	--	--
		OVERALL	--	--	--

*Extracted from SimTraffic simulation software

Based on the results of the queuing analysis during the evening peak hour, the southbound approach is projected to have a maximum queue length of 77 feet under the two-stage left turn conditions (with receiving lane). The queue is not projected to exceed the available storage of the exiting approach and represents a reduction of 36 feet from Build Conditions. The queuing analysis results are summarized in **Table 13**.

Table 13. 2025 PM Peak Hour Queuing Analysis – US 17 Business and Glenalice Lane

INTERSECTION		PM Peak (No Build)		PM Peak (Build)	PM Peak (Build w Receiving Lane)
		Conditions	Conditions	Conditions	Conditions
		Maximum Queue (ft)*	Maximum Queue (ft)*	Maximum Queue (ft)*	Maximum Queue (ft)*
Intersection #2: US 17 Business & Glenalice Lane (2025 PM No Build vs. Build w Receiving Lane Conditions)	Approach	Movement			
		L		113	57
	SB	R		77	77
		Approach	20	--	--
		OVERALL	--	--	--

*Extracted from SimTraffic simulation software

As shown in **Tables 12** and **13**, the implementation of a two-stage left turn for southbound traffic at this location would greatly reduce the projected maximum queue length for the southbound approach. The existing two-way left turn lane along US 17 Business at this location could be re-striped to accommodate this layout, so no additional right-of-way would be required. Additionally, delineators could be installed to enhance safety and driver expectation at this location.

Auxiliary Turn Lane Warrant Analysis

The forecasted right turn volumes entering Glenalice Lane were evaluated to determine the need for the installation of a westbound right turn lane to access the proposed site.

Figure 7 has been extracted from the VDOT Access Management Design Standards for Entrances and Intersections (VDOT's Roadway Design Manual – Appendix F). This figure outlines the traffic volumes required to satisfy a right turn lane warrant at an intersection.

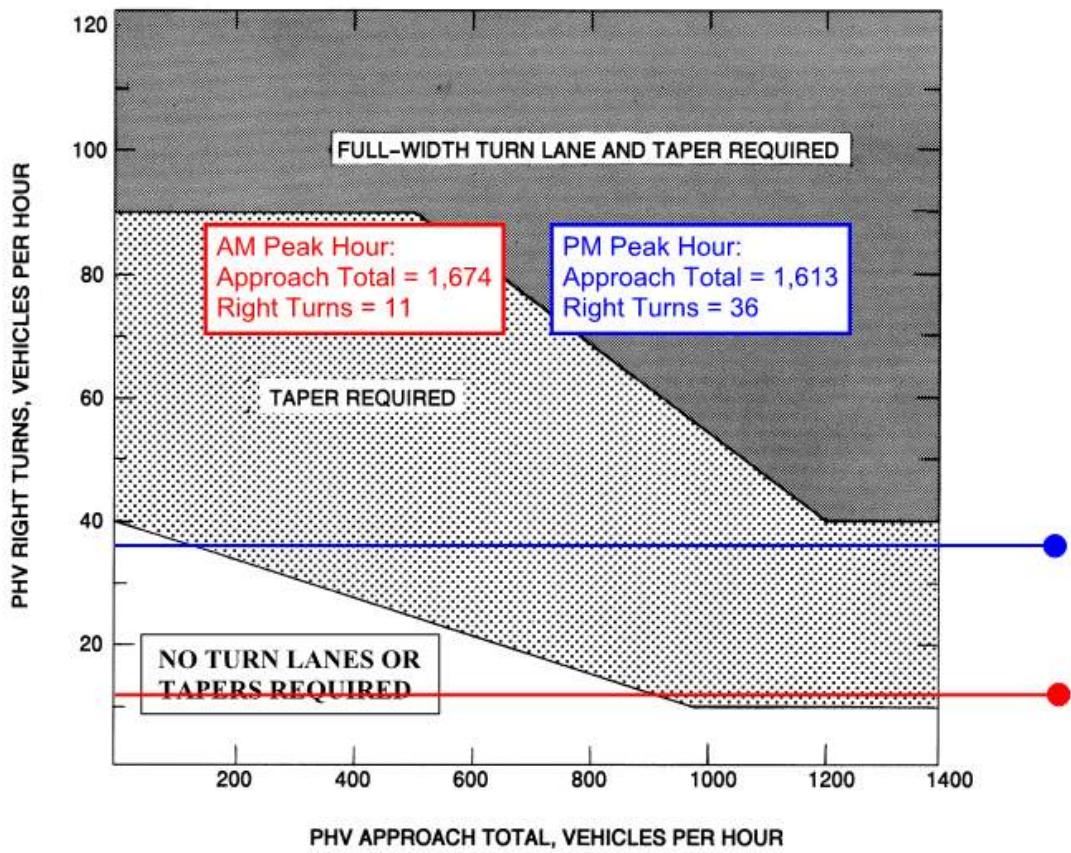


Figure 7. Right Turn Lane Evaluation Warrant at US 17 Business and Glenalice Lane

As shown on **Figure 7**, the projected traffic volumes indicate that the installation of a westbound right turn taper is warranted at this location during both the AM and PM peak hours.

Conclusions

- The Renaissance at Falmouth is expected to generate 143 trips (35 in and 108 out) during the morning peak hour and 178 trips (109 in and 69 out) during the evening peak hour.
- The capacity analysis results indicate the following:
 - At US 17 Business and Olde Forge Drive/RV Parkway, the overall intersection level of service ("C" during the morning peak hour and "D" during the evening peak hour) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 0.3 seconds during the morning peak hour and 3.4 seconds during the evening peak hour with the addition of the proposed development's site traffic. The levels of service for all turning movements and approaches are not projected to change from No Build to Build Conditions.
 - At US 17 Business and Glenalice Lane, the overall intersection level of service ("A" during the morning and evening peak hours) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 1.5 seconds during the morning peak hour and 1.3 seconds during the evening peak hour with the addition of the proposed development's site traffic. The southbound approach is projected to degrade under Build Conditions from a LOS D during the morning and evening peak hours to a LOS E during the morning peak hour and a LOS F during the evening peak hour.
 - The southbound approach is anticipated to only serve the proposed development, and these conditions are typical for left-turning traffic entering a major corridor from a minor street at an unsignalized intersection. The traffic signals at US 17 Business/Olde Forge Dr/RV Pkwy and US 17 Business/Solomon Dr/Lendall Ln could potentially be used as a metering system to improve the levels of service for this approach by producing gaps in the mainline traffic.
 - An additional solution to improve queuing at the southbound approach could be to re-stripe the intersection to allow southbound vehicles to perform a two-stage left turn to exit Glenalice Lane onto US 17 Business. A two-stage left turn at this location would allow exiting vehicles to wait for westbound traffic to clear, then maneuver into the center lane of US 17 Business, and then wait for eastbound traffic to clear before merging into the traffic stream.

The existing two-way left turn lane along US 17 Business at this location could be restriped to accommodate this layout. Therefore, additional right-of-way would not be required. Additionally, delineators could be installed to enhance safety and driver expectation at this location.

- At US 17 Business and Solomon Drive/Lendall Lane, the overall intersection level of service ("C" during the morning and evening peak hours) is not projected to change from 2025 No Build to 2025 Build Conditions. The overall intersection delay is projected to increase by 0.4 seconds during the morning peak hour and 0.7 seconds during the evening

peak hour with the addition of the proposed development's site traffic. The levels of service for all turning movements and approaches are not projected to change from No Build to Build Conditions.

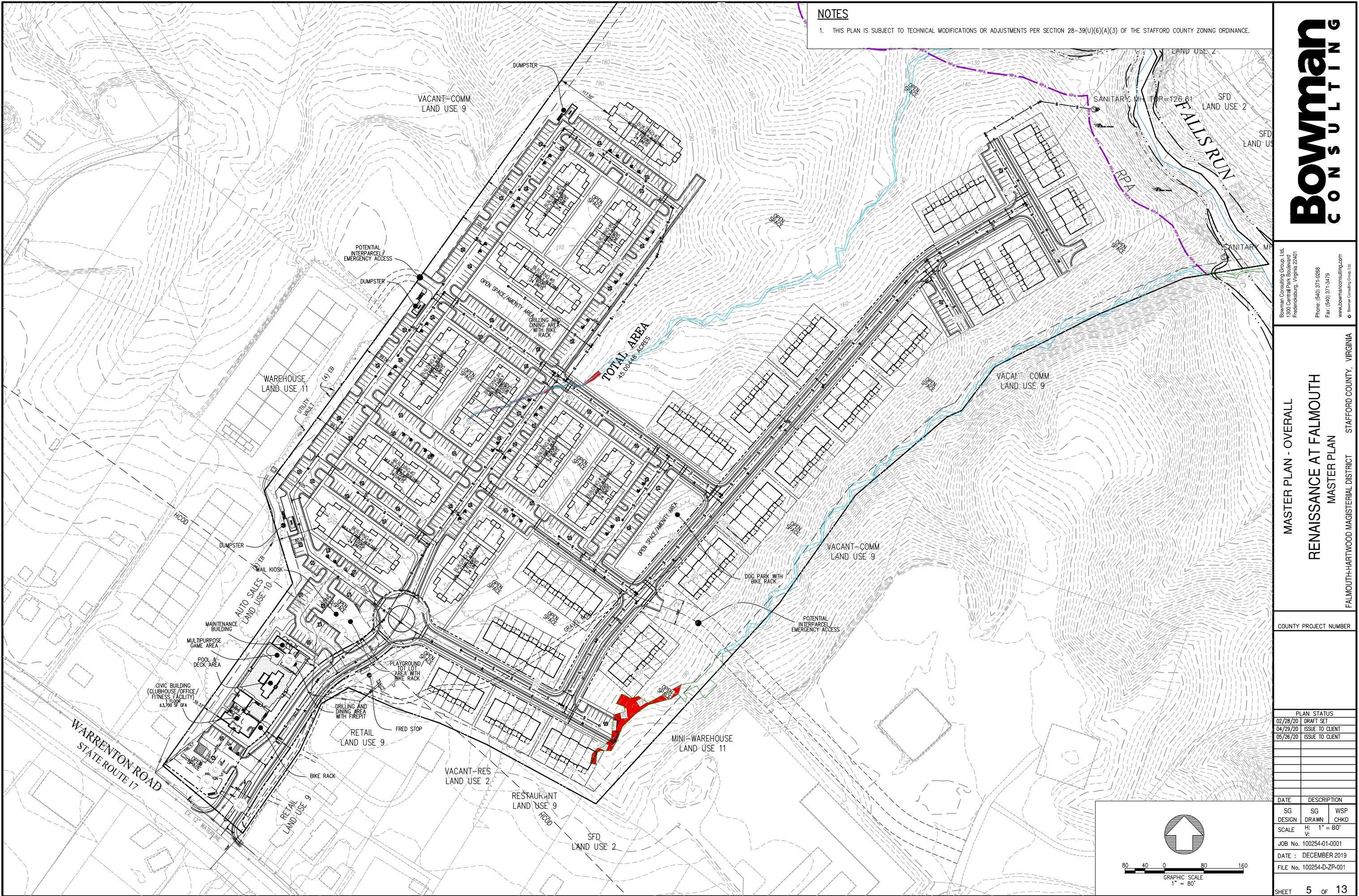
- Queuing analyses were conducted under the 2025 Build Conditions with a two-stage left turn in place at US 17 Business and Glenalice Lane. The results of the queuing analyses indicate that the projected southbound queue at this location would be reduced from Build Conditions by 266 feet during the morning peak hour and 36 feet during the evening peak hour.
- Based on coordination with VDOT, there are planned improvements at the I-95 and Warrenton Road interchange, including a proposed traffic signal at the exit ramps. These improvements would require traffic signal retiming at several locations along the US 17 Business corridor, including the study intersections evaluated in this report. These timing changes should help facilitate traffic operations throughout the US 17 Business corridor.
- The results of the right turn lane warrant analysis indicate that the installation of a westbound right turn taper from US 17 Business onto Glenalice Lane is warranted during both the morning and evening peak periods under full build out of the proposed development.
- **The capacity analysis results indicate that the addition of the site traffic associated with the proposed development is not expected to adversely impact the existing roadway network.**



Appendix A: Conceptual Plan

NOTES

1. THIS PLAN IS SUBJECT TO TECHNICAL MODIFICATIONS OR ADJUSTMENTS PER SECTION 28-39(U)(6)(A)(3) OF THE STAFFORD COUNTY ZONING ORDINANCE.





Appendix B: Approved Pre-Scope of Work Meeting Form



PRE-SCOPE OF WORK MEETING FORM

Information on the Project Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information

Consultant Name: Tele: E-mail:	Bowman Consulting Group - Carlos G. Garcia, PE 804-616-3240 cgarcia@bowmanconsulting.com
Developer/Owner Name: Tele: E-mail:	Tom Johnson - S.L. Nusbaum Realty Company 1700 Wells Fargo Center, 440 Monticello Ave, Norfolk, VA 23510 757-627-8611

Project Information

Project Name:	The Renaissance at Falmouth		
Project Location: (Attach regional and site specific location map)	US 17 Business (Warrenton Rd), Stafford County, Virginia (See Figures 1 and 2)		
Project Description: Including type of application (rezoning, subdivision, site plan), acreage, business square ft, number of dwelling units, access location, etc. Attach additional sheet if necessary)	The Renaissance at Falmouth site is located in Stafford County, Virginia or Tax Parcels 45-69, 45-67A, 45-67, 45-96, 45-95, and 45-94. The site is zoned UD-3 and contains approximately 44.54 acres. The project consists of 264 apartments (3 stories) and 114 single-family attached units (3 stories). Access to the site will be provided via the existing Glen Alice Lane.		
Locality/County:	Stafford County		
Proposed Use: (Check all that apply; attach additional pages as necessary)	<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Commercial	<input type="checkbox"/> Mixed Use
	<input type="checkbox"/> Other		
	Residential # of Units: <u>378</u>	Mixed Use : # Res. Units: _____	
	Commercial Use Sq Ft: _____	ITE LU Code(s): _____	
	ITE LU Code(s): <u>220</u> <u>221</u> _____	Commercial Use Sq Ft: _____	
		ITE LU Code(s): _____	
		Other : ITE LU Code(s): _____	
		Sq Ft: _____	

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

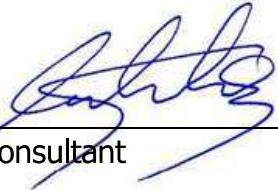
Traffic Impact Analysis Assumptions					
Study Period	Existing Year: 2020		Build-out Year: 2025		Design Year: N/A
Study Area Boundaries (Attach map)	North: Short Street		South: Lendall Lane/Solomon Drive		
	East: Site Boundary		West: US 17 Business		
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	New traffic signal at the intersection of US 17 Business and Olde Forge Drive/RV Parkway.				
Consistency With Comprehensive Plan	Yes				
Available Traffic Data (Historical, forecasts)	Turning movement counts (2017) from the Rappahannock Landing TIA. Traffic Data from Virginia Roads (ADT's) See attached.				
Trip Distribution (Attach sketch)	Road Name: US 17 Business	N <u>65</u> %	S <u>35</u> %	E _____ %	W _____ %
See attached documents for additional clarification	Road Name:	N _____ %	S _____ %	E _____ %	W _____ %
	Road Name:	N _____ %	S _____ %	E _____ %	W _____ %
	Road Name:	N _____ %	S _____ %	E _____ %	W _____ %
Annual Vehicle Trip Growth Rate:	2%	Peak Period for Study (check all that apply)		<input checked="" type="checkbox"/> AM	<input checked="" type="checkbox"/> PM <input type="checkbox"/> SAT
Study Intersections and/or Road Segments (Attach additional sheets as necessary)	1. US 17 Business and Olde Forge Drive/RV Parkway	6.			
	2. US 17 Business and Glen Alice Lane	7.			
	3. US 17 Business and Lendall Lane/Solomon Drive	8.			
	4.	9.			
	5.	10.			
Trip Adjustment Factors	Internal allowance: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Reduction: _____ % trips	Pass-by allowance: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Reduction: _____ % trips			
Software Methodology	<input checked="" type="checkbox"/> Synchro <input type="checkbox"/> HCS (v.2000/+) <input type="checkbox"/> aaSIDRA <input type="checkbox"/> CORSIM <input checked="" type="checkbox"/> Other <u>SimTraffic</u>				
Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	US 17 Business and Olde Forge Drive/RV Parkway US 17 Business and Lendall Lane/Solomon Drive				

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Improvement(s) Assumed or to be Considered	Potential traffic signal re-timing. The need for auxiliary lanes will be evaluated at Route 17 Business/Glen Alice Lane.
Background Traffic Studies Considered	Rappahannock Landing Dunkin Donuts TIA
Plan Submission	<input type="checkbox"/> Master Development Plan (MDP) <input checked="" type="checkbox"/> Generalized Development Plan (GDP) <input type="checkbox"/> Preliminary/Sketch Plan <input type="checkbox"/> Other Plan type (Final Site, Subd. Plan)
Additional Issues to be addressed	<input checked="" type="checkbox"/> Queuing analysis <input checked="" type="checkbox"/> Actuation/Coordination <input type="checkbox"/> Weaving analysis <input type="checkbox"/> Merge analysis <input checked="" type="checkbox"/> Bike/Ped Accommodations <input checked="" type="checkbox"/> Intersection(s) <input checked="" type="checkbox"/> TDM Measures <input checked="" type="checkbox"/> Other <u>Turn lane warrant</u>

Coordination with FRED Transit.

NOTES on ASSUMPTIONS: _____

SIGNED: _____ DATE: 12/17/2019

 Applicant or Consultant

PRINT NAME: Carlos G. Garcia, PE
 Applicant or Consultant

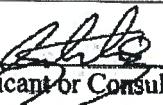
It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

SCOPE OF WORK MEETING CONCLUSIONS**ADDITIONS TO THE VDOT REQUIRED ELEMENTS, CHANGES TO THE METHODOLOGY OR STANDARD ASSUMPTIONS, AND SIGNATURE PAGE**

Any additions to the VDOT Required Elements or changes to the Methodology or Standard Assumptions due to special circumstances that are approved by VDOT:

At the scoping meeting it was discussed and agreed that Bowman would use the traffic counts from the Rappahannock Landing TIA for this analysis. These counts will be grown to 2020 using a 2% growth rate, and the Rappahannock Landing and Cherryview Landing background traffic will be added to the network.

The applicant will contact VDOT and the locality prior to the preparation of the traffic impact analysis study in the event there are any substantial changes in the existing conditions that will affect the scope of the study.

AGREED:  DATE: 12/17/2019
Applicant or Consultant

PRINT NAME: _____
Applicant or Consultant

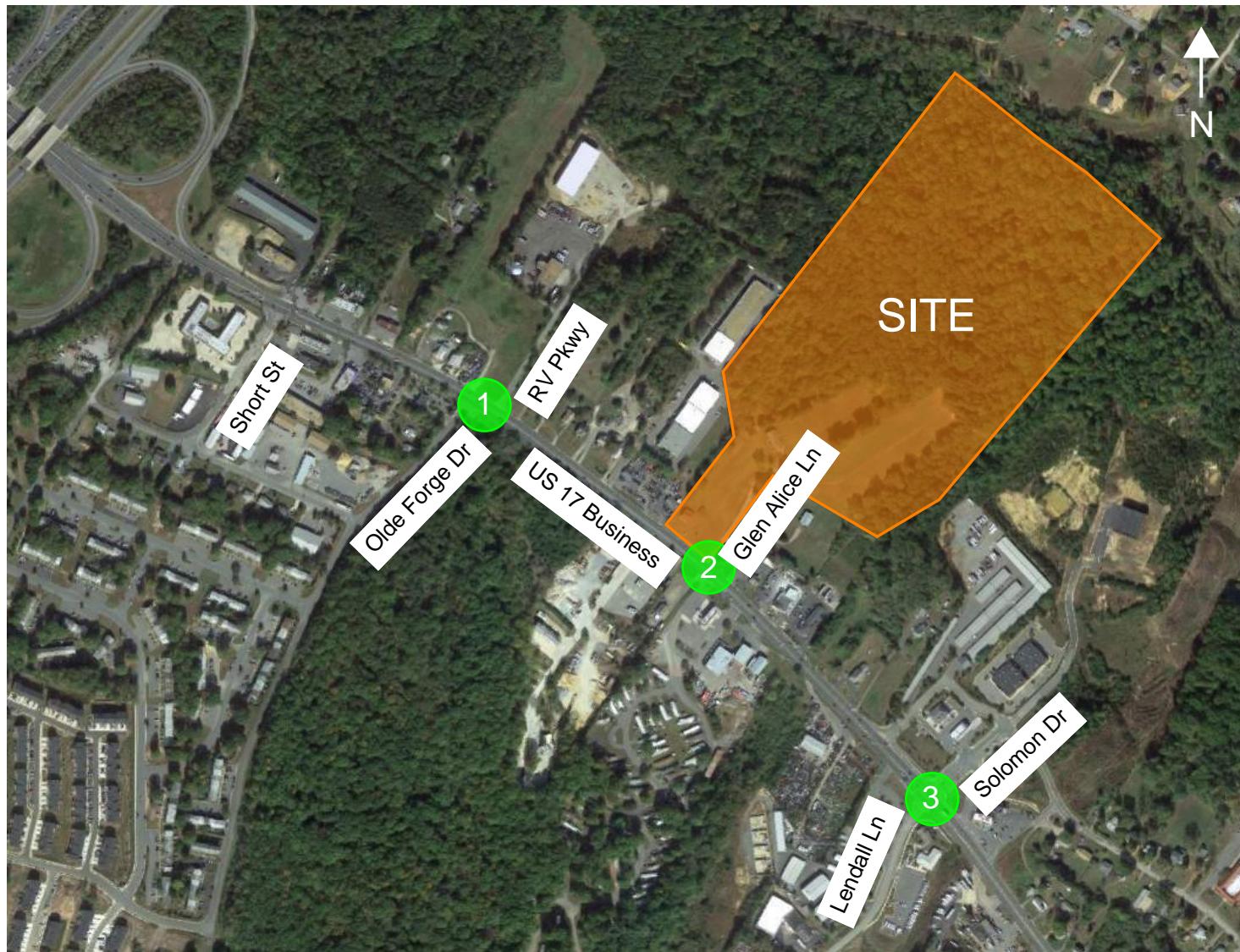
SIGNED:  DATE: 12/19/2019
VDOT Representative

PRINT NAME: _____
VDOT Representative

SIGNED:  DATE: 12/19/2019
Local Government Representative

PRINT NAME: MICHAEL ZURAF
Local Government Representative

Figure 1. Site Location



Intersections:

1. US 17 Business and Olde Forge Dr/RV Pkwy
2. US 17 Business and Glen Alice Ln
3. US 17 Business and Lendall Ln/Solomon Dr



Figure 2. Site Location

Trip Generation (Per ITE Trip Generation Manual - 10th Edition)

Land Use ⁽¹⁾	Land Use Code	Size	Units	AM Peak Hour			PM Peak Hour			Weekday		
				In	Out	Total	In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise)	220	114	D.U.	12	42	54	41	25	66	410	411	821
Multifamily Housing (Mid-Rise)	221	264	D.U.	23	66	89	68	44	112	718	719	1437
Total, Average Weekday	--	--	--	35	108	143	109	69	178	1128	1130	2258

US 17 Business

Posted Speed Limit: 45 MPH

ADT: 34,000

Figure 3. Trip Distribution



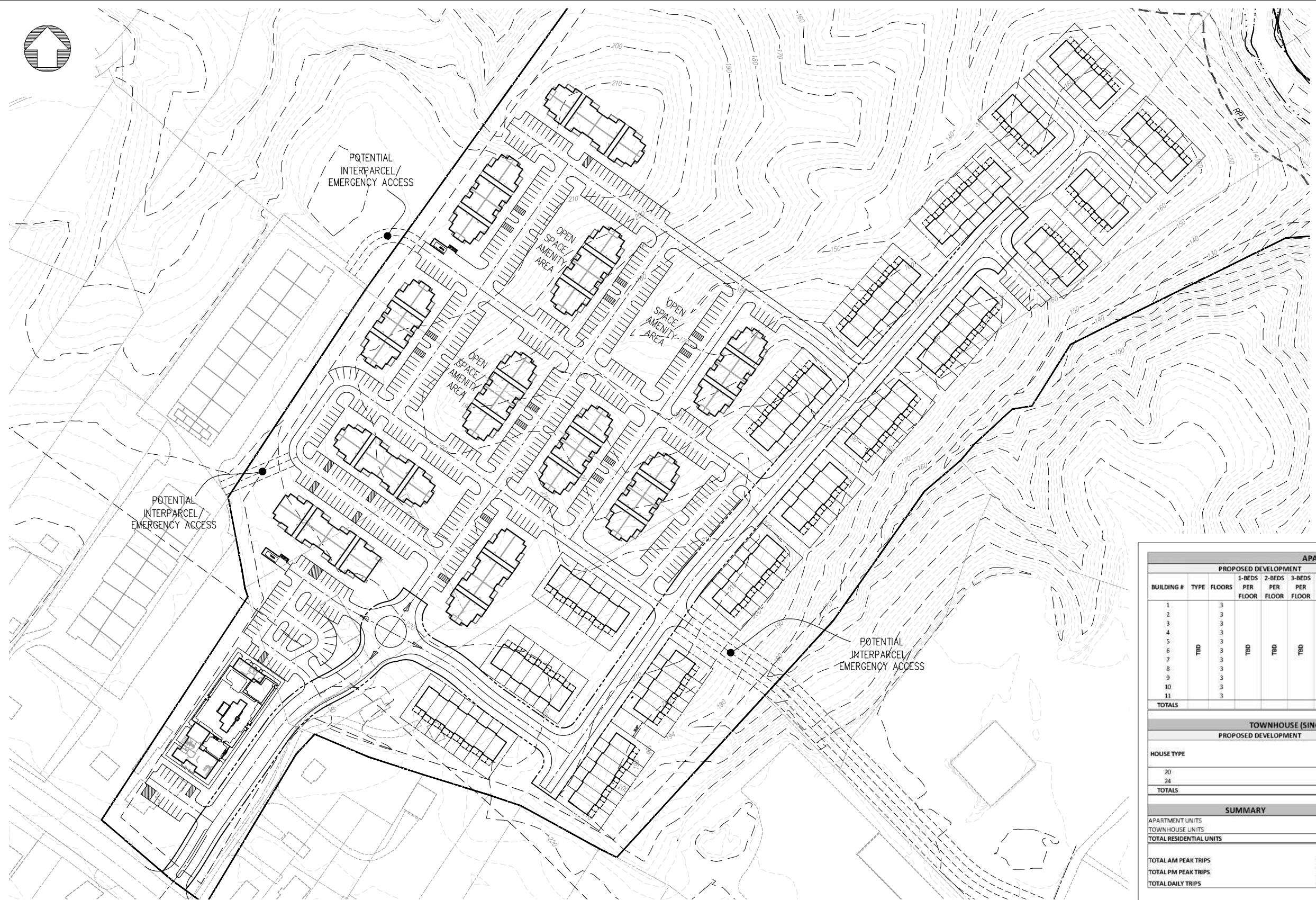
Note: These rates were discussed and agreed upon during the scoping meeting held with VDOT and County officials on December 16, 2019.

TIA SCOPING MEETING SIGN-IN SHEET

Project: Renaissance at Falmouth
 County: Stafford

Meeting Date: 12-16-19
 Place/Room: VDOT

Name (check if present)	Company	Phone	E-Mail
<input checked="" type="checkbox"/> David Beale	VDOT - TLU	540-654-1973	david.beale@vdot.virginia.gov
<input type="checkbox"/> Stephen Haynes	VDOT - Planning	540-899-4709	stephen.haynes@vdot.virginia.gov
<input checked="" type="checkbox"/> Peter Hedrich	VDOT - Traffic Eng.	540-899-4540	peter.hedrich@vdot.virginia.gov
<input checked="" type="checkbox"/> Margaret Niemann	VDOT - TLU	540-899-4106	margaret.niemann@vdot.virginia.gov
<input type="checkbox"/> Lynne Keenan	VDOT- RA	540-899-4447	lynne.keenan@vdot.virginia.gov
<input checked="" type="checkbox"/> Mike Zuraf	Stafford County	540-658-8668	MZuraf@staffordcountyva.gov
<input type="checkbox"/> Brian Geouge	Stafford County	540-658-8668	BGeouge@staffordcountyva.gov
<input type="checkbox"/> Catherine Coffey	VDOT - L & D	540-899-4280	Catherine.coffey@vdot.virginia.gov
 MICHAEL YOUNG	BOWMAN CONSULTING GROUP		MYOUNG@BOWMANCG.COM
Carlos Garcia	Bowman Consulting		cgarcia@bowmancg.com
Bill Pyke	Bowman		bpyke@bowmancg.com
Alex Owsiank	Stafford County	540-658-4593	aowsiank@staffordcountyva.gov
DONALD D. LOAN	VDOT	540-607-1427	DONALD.D.LOAN@VDOT.VIRGINIA.GOV
Andrew Thorpe	VDOT	804-229-6438	Andrew.Thorpe@vdot.virginia.gov

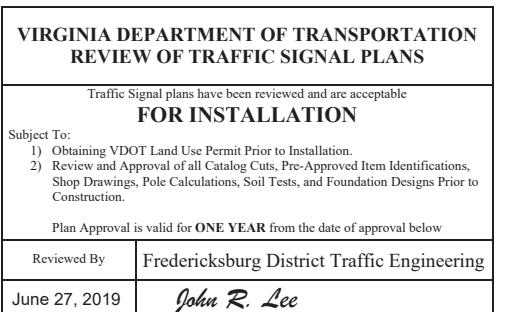




Appendix C: Approved Traffic Signal Plan at Warrenton Road and Olde Forge Drive/RV Parkway

INDEX OF SHEETS

Sheet No:	Sheet Description:
1	Index of Sheets, General Notes & Legend
2	Street Sign Details
3	Traffic Signal Plan - Rte.17 Business (Warrenton Road) & Olde Forge Dr
4	Traffic Signal Pole Placement
5	Transportation Management Plan



GENERAL NOTES - TRAFFIC SIGNALS

- The following items and operations shall conform to the standard listed below:

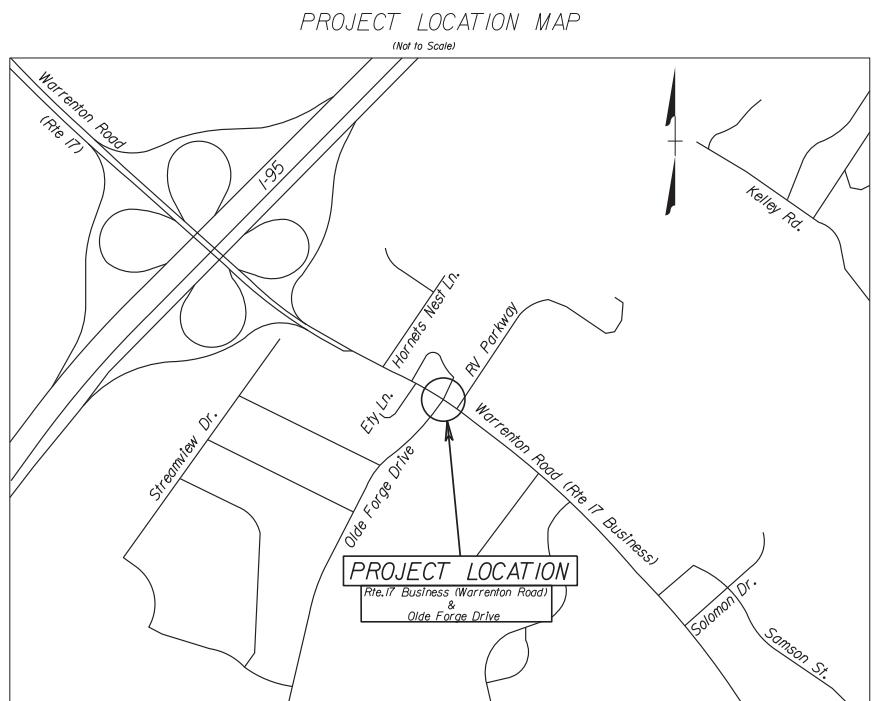
Signal Pole Foundation	PF-8
Conduit Installation	LS-I or Bored
Sign Head Hangers	SM-3
Sign Header	SMD-2
Junction Box	IB-S2, IB-S3
Controller Cabinet Foundation	CF-I
Electrical Service	SE-5
Loop Detector	TD-I, TD-IB
Pedestrian Actuation	PA-1
Pedestrian Pole	PF-2, PF-3
Pedestrian Signal Head	SP-9
Square Tube Sign Post	STP-1
- The Controller Cabinet & CF-I foundation may be relocated within the designated corner provided it remains within the right of way or proposed easement,outside of the clear zone and pavement sections,does not conflict with utilities,does not limit sight distance, and is in accordance with the Electric Service Standard detail referenced to the installation.
- Junction boxes may be relocated in the field as necessary provided they remain outside the right of way,do not conflict with utilities and remain outside the pavement section,Avoid to the maximum extent possible the installation of junction boxes on existing and/or proposed sidewalks.
- The placement of 6'x50' loops shown on the plans shall be 2' in front of stop bars and all 6'x6' loops shall be installed at the distances specified on the plans.
- The electric service connection and service line locations may be field adjusted as necessary provided all equipment remains within the right of way or proposed easement,does not conflict with utilities and remains outside the pavement sections.
- All underground and overhead utilities shown on these plans are approximate only and may not be complete. At least 72 hours prior to beginning signal work, the Contractor shall contact "Miss Utility of Virginia" at 1-800-552-7001 in order to determine the extent, location, and identify all of the utilities within the work area. At least 5 full working days prior to beginning signal work, the Contractor shall contact "Fredericksburg Municipal Utility Board" at 540-899-7626. In addition, the Contractor shall identify all underground signal equipment owned by VDOT within the project limits. If the Contractor perceives a conflict between utilities and the proposed traffic signal equipment, the Contractor shall notify the Engineer immediately so that the conflict may be reviewed. The Contractor shall be responsible for repairing or replacing, at their own expense, any existing utilities, pavement, concrete items, etc., that are damaged or disturbed during construction.
- Signal pole foundations may be field adjusted within the designated corners no more than 2' in any direction from the plan locations,provided that the revised foundation locations:
 - Remain out of the clear zone and pavement sections.
 - Remain within the right of way or proposed easement.
 - Does not conflict with utilities.
 - Does not limit sight distance.
 - Does not affect drainage.
 - Allow the signal heads to be adjusted with the same alignment with the designated travel lanes as shown on the plans, and is in accordance with the PF-8 Concrete Foundation Standard detail referenced to the installation.
- The Contractor shall verify mast arms lengths and signal head lane coverage prior to the installation of signal pole foundations.
- All poles shall be field staked by the Contractor and Inspected by the Engineer and Contractor per Section 700.04 prior to installation of foundations.
- Traffic signal heads and mast arm signs may be field adjusted no more than 2' in either direction on the mast arms,provided they remain within the designated travel lane assignments.If further adjustment is needed, the Project Inspector shall contact John Lee at 540-899-4099 or JohnLee@vdotvirginia.gov.
- All unused wires in the signal heads shall be capped individually with crimp type caps.
- Conduit systems shall be bonded in accordance with Section 700 of the Road & Bridge Specifications.
- All equipment is to be installed within the existing or proposed R/W or easement.
- All underground and overhead utilities shown on these plans are approximate only and may not be complete.
- Initial timelings and TE 306J compliant signed and sealed YRIC with supporting documentation need to be submitted to Mr. James Haegle at 540-582-7531 before equipment installation.
- Contractor must coordinate the installation of the RIO-IIA LED Sign with the Department's Traffic Engineer (VDOT's Fredericksburg District) prior to installation. The Department is to determine the type of LED sign to be used at this location (Legend vs. Symbol).

STANDARD TRAFFIC SIGNAL LEGEND

PLAN ITEM	PLAN SYMBOL
	PROPOSED
Metal Signal Pole & Foundation and Mast Arm (As noted in Signal Pole Legend)	●—
Pedestrian Pole and Foundation (Std.PF-2)	□
Traffic Signal Head w/ Backplate	●→
Traffic Signal Head w/o Backplate	→
Pedestrian Signal Head	□ PB
Pedestrian Pushbutton & Sign (Std.PA-2)	●—
Traffic Signal Sign Mast Arm or Span Wire Mt'd. Pole Mounted	—
Video Detection Camera	■
Junction Box (Std.as noted on plans)	6'x20'
Loop Detector (Size as noted on plans)	6'x20'
Video Detection Zone (Size as noted on plans)	6'x20'
Conduit	=====
Ground Mounted Sign	●

PLAN ITEM	PLAN SYMBOL
	PROPOSED
Electrical Service Meter	▽ SW
Electrical Service Safety Switch (Disconnect)	▽ SD
Controller Cabinet	Ground Mounted
	Pole Mounted
Master Controller Cabinet	Ground Mounted
	Pole Mounted
	Std.CF-I
Controller Cabinet & Foundation	Std.CF-3
	Std.CF-4
	Std.CF-I
Master Controller Cabinet & Foundation	Std.CF-3
	Std.CF-4
Uninterruptible Power Supply Cabinet	MC-3
Electrical Service	Std.SE-5

LABELS					
Signal Pole or Controller	Ⓐ	Proposed Signal Head	Ⓑ	Signal Phasing	∅2
Cable and Conduit	△	Proposed Pedestrian Signal Head	Ⓑ	Pedestrian Phasing	∅2
Junction Box	Ⓢ			Sign	S-1
				Video Detection Camera	VDC-1



PLAN STATUS	NO.	DATE	DESCRIPTION
1 02/06/19	90%	02/06/19	100% SUBMITTAL
2 03/08/19	100%	03/08/19	FINAL PLAN SET
3 04/24/19		04/24/19	
4			
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**VIRGINIA DEPARTMENT OF TRANSPORTATION
REVIEW OF TRAFFIC SIGNAL PLANS**

Traffic Signal plans have been reviewed and are acceptable
FOR INSTALLATION

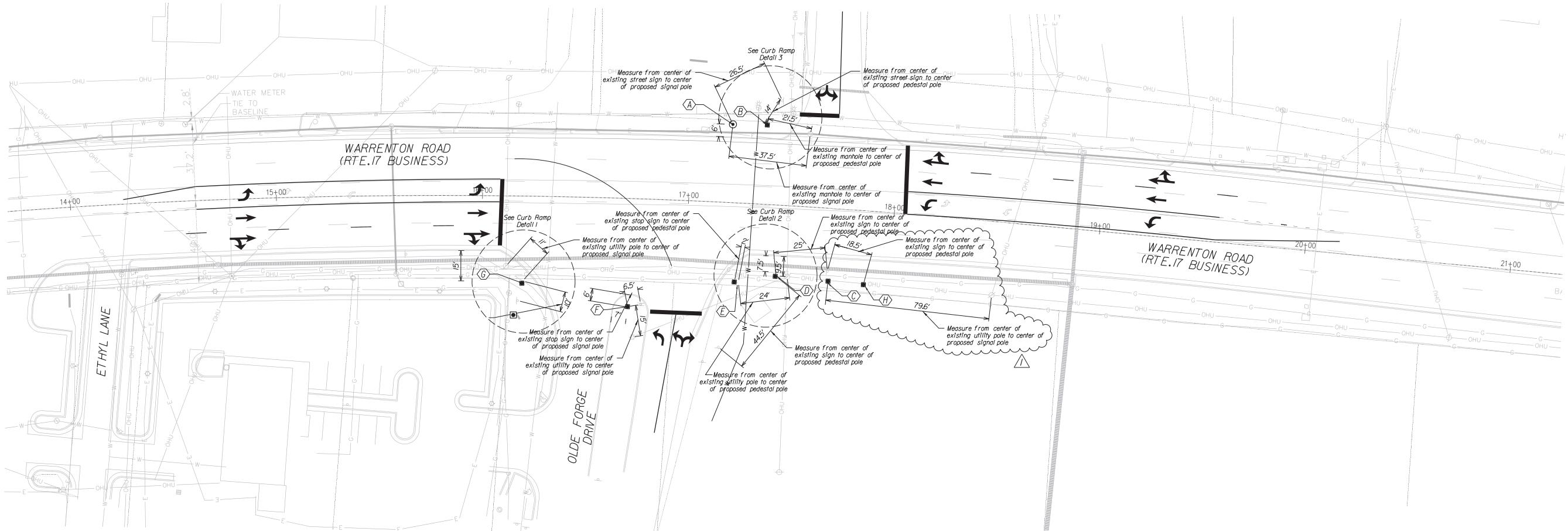
- To:
Obtaining VDOT Land Use Permit Prior to Installation.
Review and Approval of all Catalog Cuts, Pre-Approved Item Identifications,
Shop Drawings, Pole Calculations, Soil Tests, and Foundation Designs Prior to
Construction.

Plan Approval is valid for **ONE YEAR** from the date of approval below.

Plan Approval is valid for ONE YEAR from the date of approval below		MUY DESIGN	MUY DRAWN	CGC CHKD
Reviewed By	Fredericksburg District Traffic Engineering			
June 27, 2019	<i>John R. Lee</i>	JOB No.	002976-01-031	
		DATE :	04/24/19	
		SHEET	02	

TRAFFIC SIGNAL POLE AND PEDESTAL PLACEMENT

SCALE
0 25' 50'



TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL POLE PLACEMENT
RTE.17 BUSINESS (WARRENTON RD) &
OLDE FORGE DR / RV PARKWAY

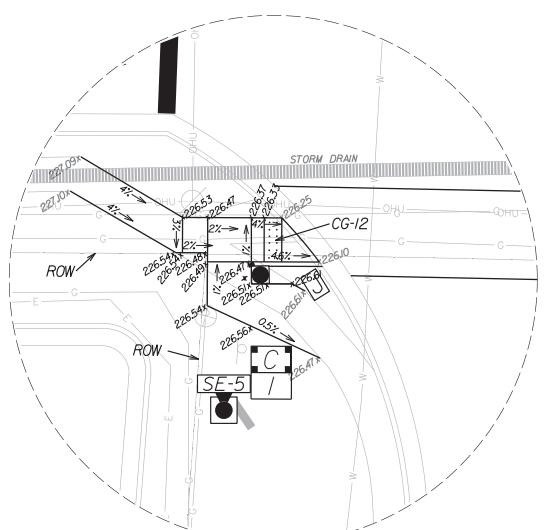
STAFFORD COUNTY

FREDERICKSBURG DISTRICT

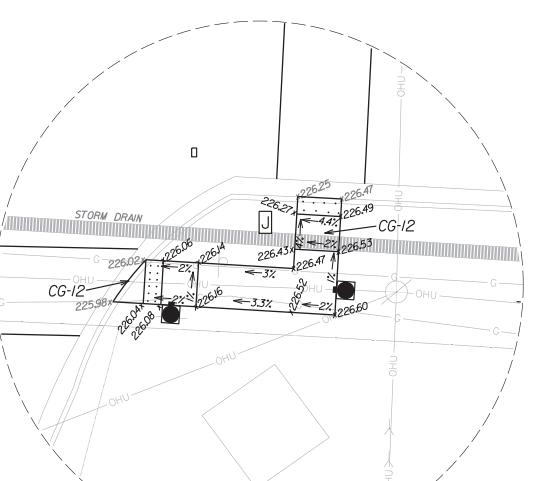


5/19/20

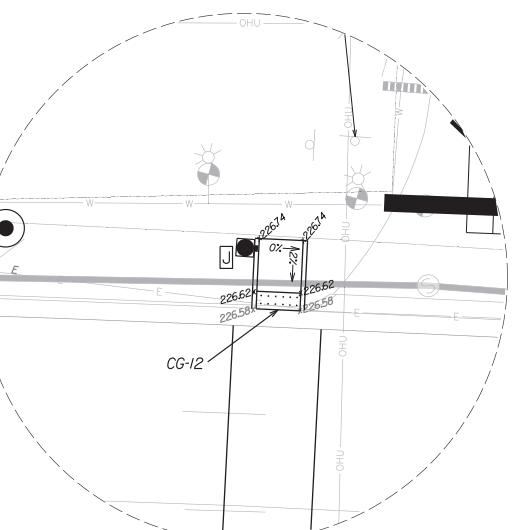
CARLOS G. GARCIA
Lic. No. 0402049766
[Signature]



ADA Curb Ramp Detail 1
Scale: 1" = 10'



ADA Curb Ramp Detail 2
Scale: 1" = 10'



ADA Curb Ramp Detail 3
Scale: 1" = 10'

VIRGINIA DEPARTMENT OF TRANSPORTATION REVIEW OF TRAFFIC SIGNAL PLANS

Traffic Signal plans have been reviewed and are acceptable
FOR INSTALLATION

Subject To:
 1) Obtaining VDOT Land Use Permit Prior to Installation.
 2) Review and Approval of all Catalog Cuts, Pre-Approved Item Identifications, Shop Drawings, Pole Calculations, Soil Tests, and Foundation Designs Prior to Construction.

Plan Approval is valid for **ONE YEAR** from the date of approval below

Reviewed By	Fredericksburg District Traffic Engineering
May 20, 2020	<i>John R. Lee</i>

PLAN STATUS	NO.	DATE	DESCRIPTION
1 02/06/19	90%	02/06/19	90% SUBMITTAL
2 03/08/19	100%	03/08/19	100% SUBMITTAL
3 04/24/19		04/24/19	FINAL PLAN SET
4 05/19/20		05/19/20	REVISION 1
MJY DESIGN	MJY DRAWN	CGC CHKO	
JOB No. 002976-01-031			
DATE : 05/19/20			
SHEET 04			

TRANSPORTATION MANAGEMENT PLAN

Introduction

- A). Project Category: A
- 1). Construction will consist of the installation of a traffic signal at the intersection of Rte. 17 (Warrenton Road) & Olde Forge Dr/RV Parkway.
- B). The length and width of the work area will be centered around the intersection, and remain within the right of way or acquired permanent easement.
- C). The work zones will be active as directed by the Engineer.

Temporary Traffic Control (TTC) Plan

- A). Major Components will consist of General Notes and special details.

- B). Specific traffic control figures and notes from the 2011 W.A.P.M. (Revision 1) used for traffic control include, but are not limited to:

- Pg. 6H-12 and 6H-13 Figure TTC-3.I
- Pg. 6H-14 and 6H-15 Figure TTC-4.I
- Pg. 6H-16 and 6H-17 Figure TTC-5.I
- Pg. 6H-38 and 6H-39 Figure TTC-16.I
- Pg. 6H-40 and 6H-41 Figure TTC-17.I
- Pg. 6H-58 and 6H-59 Figure TTC-26.I
- Pg. 6H-60 and 6H-61 Figure TTC-27.I
- Pg. 6H-64 and 6H-65 Figure TTC-29.I
- Pg. 6H-76 and 6H-77 Figure TTC-35.I
- Pg. 6H-78 and 6H-79 Figure TTC-36.I

- C). For new installations:

1. The Contractor shall install a portable changeable message sign (PCMS) 24 hours prior to the signal being turned onto "Flash" with messages of "NEW SIGNAL AHEAD" and "ON OR ABOUT MM/DD" at the approaches listed below.

2. The PCMS shall remain in place for 48 hours once the signal is in full color operation, with the messages changed to "SIGNAL AHEAD" and "BE PREPARED TO STOP".

3. The Engineer shall review and approve all PCMS locations and confirm the sign messages prior to activation.

- D). Special Details:

There are no special details for this project that are not addressed in the current Work Area Protection Manual.

Public Communications Strategies:

Public Communications Plan:

- VDOT Fredericksburg District
- Route Number(s): Rte 17 (Warrenton Rd), Olde Forge Dr/RV Parkway

Traffic Impacts:

- Traffic control shall consist of single lane closures.
- Motorists should be alerted to the possibility of daytime lane and shoulder closures when work begins.

Goals:

- To inform the public about the project.
- To minimize disruption through proactive information through dissemination efforts.
- To establish a crisis communication plan.

Messages:

- Benefits and purpose of this project.
- Contacts for more information.

Route	Route Name	Begin Location	End Location	Direction	Number Lanes Existing	Number Lanes OPEN	Max. Distance between Flaggers	Monday To Thursday	Friday	Saturday & Sunday
17 Business	Warrenton Road	GlenAlice Lane	Hornets Nest Lane	N8	3	2	-	12AM-5AM 7PM-12AM	12AM-5AM 10PM-12AM	12AM-9AM 10PM-12AM
				S8	3	2	-	12AM-7AM 10PM-12AM	12AM-7AM 10PM-12AM	12AM-9AM 10PM-12AM
	Olde Forge Drive	Thomas Lane	Warrenton Road	EB	2	1	-	12AM-7AM 9PM-12AM	12AM-7AM 9PM-12AM	12AM-9AM 10PM-12AM

At least one mainline lane per direction of traffic must be maintained at all times.
The Work Week shall begin Sunday Evening at 9:00 PM and end Friday Morning at 6:00 AM.
The time frames outside of these parameters shall be defined as Weekends.

Transportation Operations Plan

- I). The process to notify the Traffic Operations Center to place lane closure information on the 511 system and VA Traffic will be:
 - a) Contractor is to provide the VDOT Project Inspector and/or Construction Manager with a tentative lane closure schedule a minimum of two weeks prior to the planned work to begin and update every Thursday.
 - b) Construction Manager to advise Resident Administrator of proposed lane closure. Maintenance Manager is to have VA Traffic operator enter data into VA Traffic, and also advise Traffic Operations Center.
- 2). The following is a list of local emergency contact agencies:
 - a) Virginia State Police: (540) 829-7766 or 1-800-572-2260 or *77 cellular
 - b) Haz-Mat Center (if spill involved): 911
- 3). Procedures to respond to traffic incidents that may occur in the work zone:
 - a) Contractor to notify Virginia State Police and VDOT Inspector in charge and Traffic Operations Center.
 - b) Depending on severity of incident, contractor may have to shut down work.
 - c) Upon arrival on scene, Virginia State Police to determine response necessary to allow traveling public around incident.
 - d) Inspector to notify construction Manager/Resident Administrator of incident and take pictures as necessary, especially pictures of contractor's work zone to verify the proper setup.
- 4). Process of notification of incident to be followed is (Contractor to call):
 - a) Traffic Operations Center Shift Supervisor: (804) 796-4520 or 1-866-378-7743
 - b) Project Maintenance of Traffic Coordinator (Inspector):
 - c) Area Land Use Engineer (David Beale)
 - d) Resident Administrator: Fredericksburg Residency, Lynne Keenan (540) 899-4302
 - e) District Traffic Engineer: Peter Hedrich, P.E., PTOE, (540) 899-4540
 - f) District Work Zone Safety Coordinator: Jeffery Stone (540) 899-4547, (540) 907-8621 Cell
 - g) District Public Affairs Manager: Kelly Hannon (540) 374-3344
- 5). The Virginia State Police will take control of the incident and direct its clearing and restoration to normal traffic conditions.
- 6). The Virginia State Police report of the incident will be reviewed by the Resident Administrator to determine if any modification of the Temporary Traffic Control Plan is necessary. If it is determined that it is necessary to alter the plan, then a meeting will be called with the Contractor, VDOT project personnel, VDOT traffic safety representatives and the Virginia State Police (if necessary) to discuss modification and implementation of an improved traffic control plan.

EMERGENCY RESPONSE CONTACTS

Fire, Police, EMS, Hospital Contacts	Phone Number, Email or Address
Stafford County Fire & Rescue	(540) 658-7200
Stafford County Police	(540) 658-4400
Stafford Hospital	(540) 741-9000
Mary Washington Hospital	(540) 741-1100

VIRGINIA DEPARTMENT OF TRANSPORTATION REVIEW OF TRAFFIC SIGNAL PLANS

Traffic Signal plans have been reviewed and are acceptable

FOR INSTALLATION

Subject To:

- 1) Obtaining VDOT Land Use Permit Prior to Installation.
- 2) Review and Approval of all Catalog Cuts, Pre-Approved Item Identifications, Shop Drawings, Pole Calculations, Soil Tests, and Foundation Designs Prior to Construction.

Plan Approval is valid for ONE YEAR from the date of approval below

Reviewed By	Fredericksburg District Traffic Engineering
June 27, 2019	John R. Lee

TRAFFIC CONTROL DEVICE PLANS

TRANSPORTATION MANAGEMENT PLAN

RTE 17 BUSINESS (WARRENTON RD) &
OLDE FORGE DR/RV PARKWAY

FREDERICKSBURG DISTRICT



PLAN STATUS

1 02/06/19 90% SUBMITAL
2 03/08/19 100% SUBMITAL
3 04/24/19 FINAL PLAN SET

NO. DATE DESCRIPTION

MJY DESIGN MJY DRAWN CGC CHKD

JOB No. 002976-01-031

DATE : 04/24/19

SHEET 05

TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL PLAN

RTE 17 BUSINESS (WARRENTON RD) & OLDE FORGE DR / RV PARKWAY

STAFFORD COUNTY



4/28/19

CARLOS G. GARCIA

Lic. No. 0402049766

PROFESSIONAL ENGINEER

STAFFORD COUNTY

FREDERICKSBURG DISTRICT

Signal Pole & Controller Legend

(ALL DIMENSIONS ARE TO CENTER OF POLE)

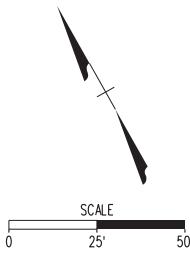
A CONTROLLER CABINET & FOUNDATION (CF-1)
See sheet 4 for Location
Sta.17-35.97, 39' LT of Warrenton Road Baseline

B PEDESTAL POLE PF-2 (10')
See sheet 4 for Location
Sta.17-44.47, 35' RT of Warrenton Road Baseline

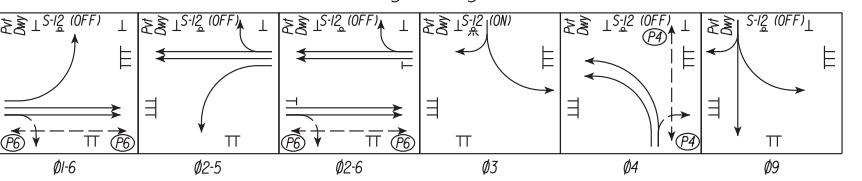
C PEDESTAL POLE PF-2 (10')
See sheet 4 for Location
Sta.17-24.08, 38' RT of Warrenton Road Baseline

D PEDESTAL POLE PF-2 (12')
See sheet 4 for Location
Sta.16-72.03, 52' RT of Warrenton Road Baseline

E PEDESTAL POLE PF-2 (12')
See sheet 4 for Location
Sta.16-20.02, 41' RT of Warrenton Road Baseline



Phasing Diagram



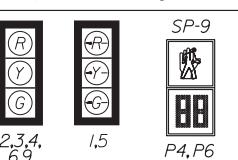
SPEED LIMITS

 Warrenton Road 45 MPH
Olde Forge Drive 25 MPH
RV Parkway 25 MPH

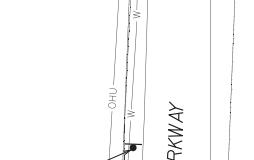
JUNCTION BOX LEGEND

All Junction Boxes shall conform to St'd.JB-S2 unless otherwise noted on the plans.
(S3) Denotes St'd.JB-S3

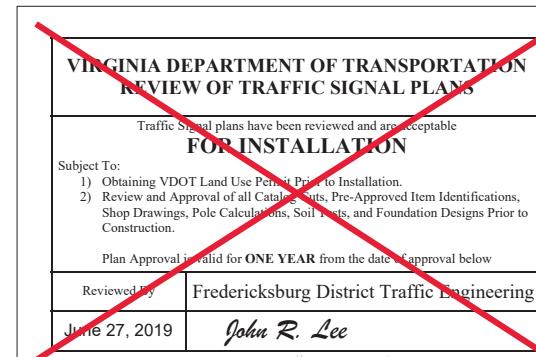
Proposed Signals



Proposed Signals


 SP-9
2,3,4,
6,9
1,5
P4,P6

 SP-9
2,3,4,
6,9
1,5
P4,P6



May 20, 2020
**Approval Rescinded due
to Utility Conflict**

TRAFFIC SIGNAL POLE AND PEDESTAL PLACEMENT

Bowman
CONSULTING

POD # _____

TRAFFIC CONTROL DEVICE PLANS
TRAFFIC SIGNAL POLE PLACEMENT
RTE.17 BUSINESS/WARRENTON RD &
OLDE FORGE DR./RN PARKWAY

STAFFORD COUNTY
G DISTRICT

BOWCO CONSULTING GROUP, LTD.
 3855 Westgate Parkway
 Richmond, Virginia 23233
 Phone: (804) 616-2008
 Fax: (804) 616-2449
www.bowmconsulting.com

TRAFFIC CONTROL DEVICE PLANS

TRAFFIC SIGNAL POLE PLACEMENT

RTE 17 BUSINESS (WARFORD RD.) &
OLDE FORGE DR / RV PARKWAY

EDERICKSBURG DIS

ADA Curb Ramp Detail I
Scale: 1" = 10'

ADA Curb Ramp Detail 2
Scale: 1" = 10'

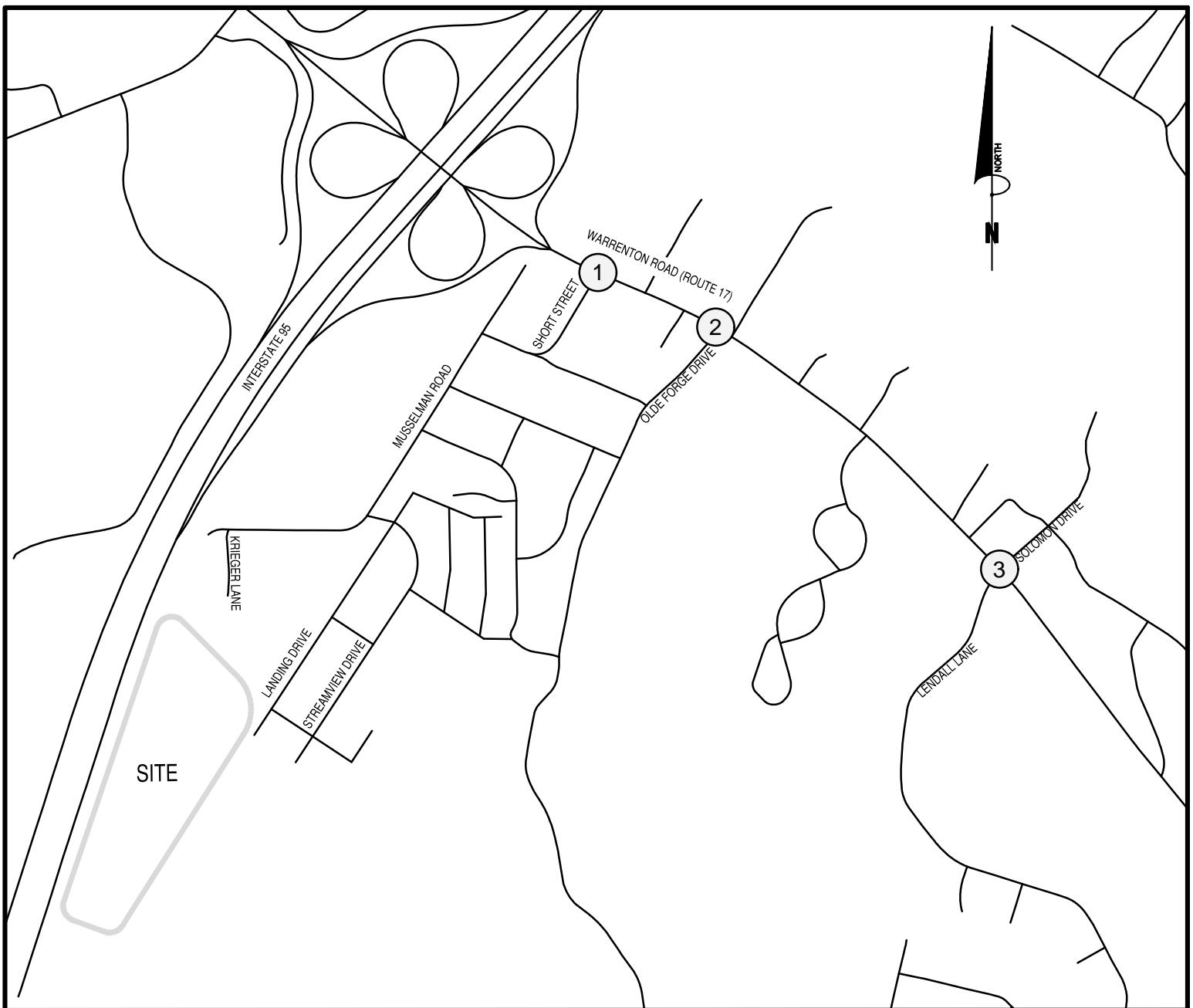
The diagram shows a circular room with a diameter divided into four quadrants by a horizontal and vertical axis. The top-right quadrant is labeled 'W' at the top and 'E' at the bottom. The top-left quadrant is labeled 'OHU' at the top and 'E' at the bottom. The bottom-right quadrant is labeled 'CG' at the top and 'E' at the bottom. The bottom-left quadrant is labeled 'OHU' at the top and 'W' at the bottom. A central vertical axis is labeled 'W' at the top and 'E' at the bottom. A horizontal axis is labeled 'E' on both ends. In the center, there is a small circle with a sun-like symbol above it. To the right of the center, there is a rectangular area with a black border and a small circle with a sun-like symbol above it. This area has labels '22651A', '22652', '22653A', '22654', '22655', and '22656'. Below this area, the text 'CG-12' is written. There are also other labels like 'J' and 'OZ' near the center. The entire diagram is enclosed in a dashed circle.

ADA Curb Ramp Detail 3
Scale: 1" = 10'

		DESCRIPTION	
NO.	DATE		
MJY SIGN	MJY DRAWN	CGC CHKD	
No. 002976-01-031			
DATE : 04/24/19			
SET 04			

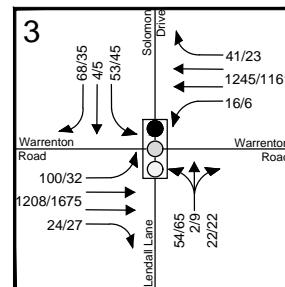
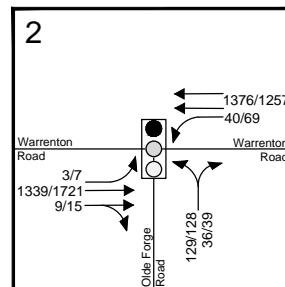
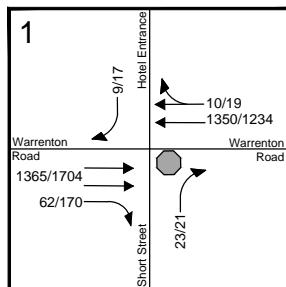


Appendix D: 2018 Traffic Count Data



LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- xx/yy AM/PM Peak Hour Volume

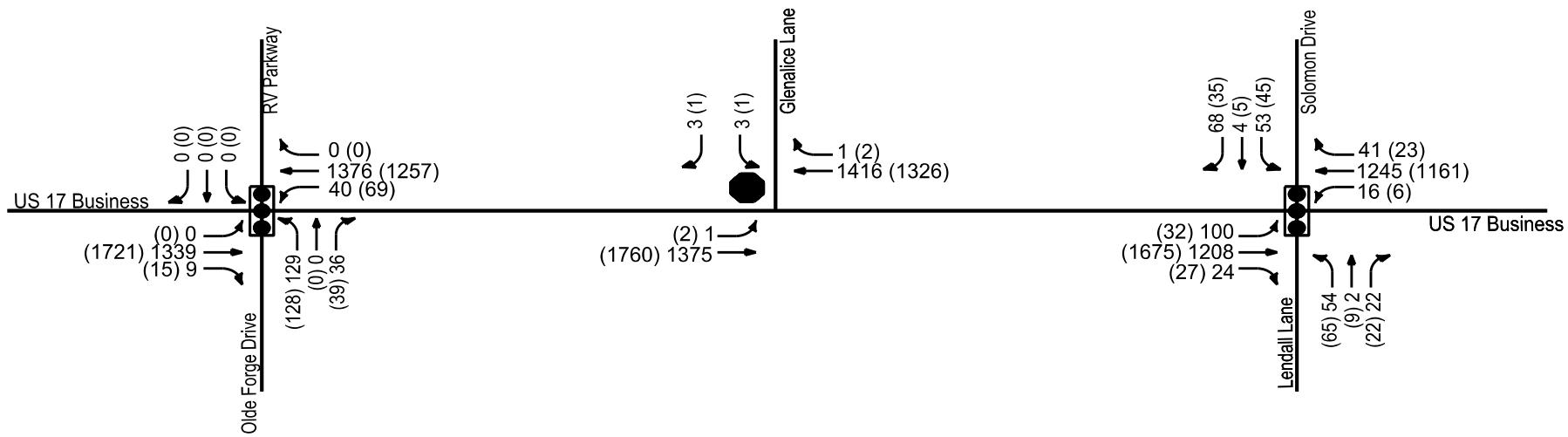


Existing Conditions with Relocated Signal (2018)
Rappahannock Landing
Stafford County, Virginia

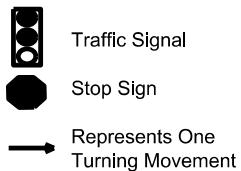
Exhibit 2



Appendix E: Traffic Volume and Traffic Distribution Exhibits



LEGEND



123 : AM Peak Hour Traffic
 (123) : PM Peak Hour Traffic
 12% : Entering Distribution
 (12%) : Exiting Distribution

DRAWING NOT TO SCALE

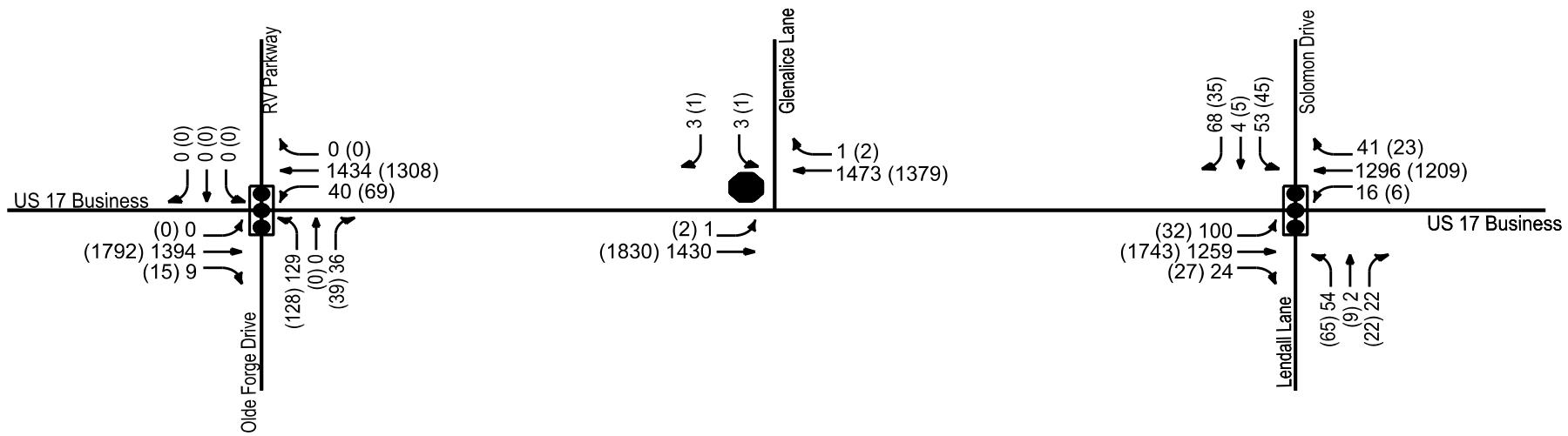


Bowman

**2018 Collected
Peak Hour Traffic Volumes**
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 1

Job # 100254-01-001



DRAWING NOT TO SCALE

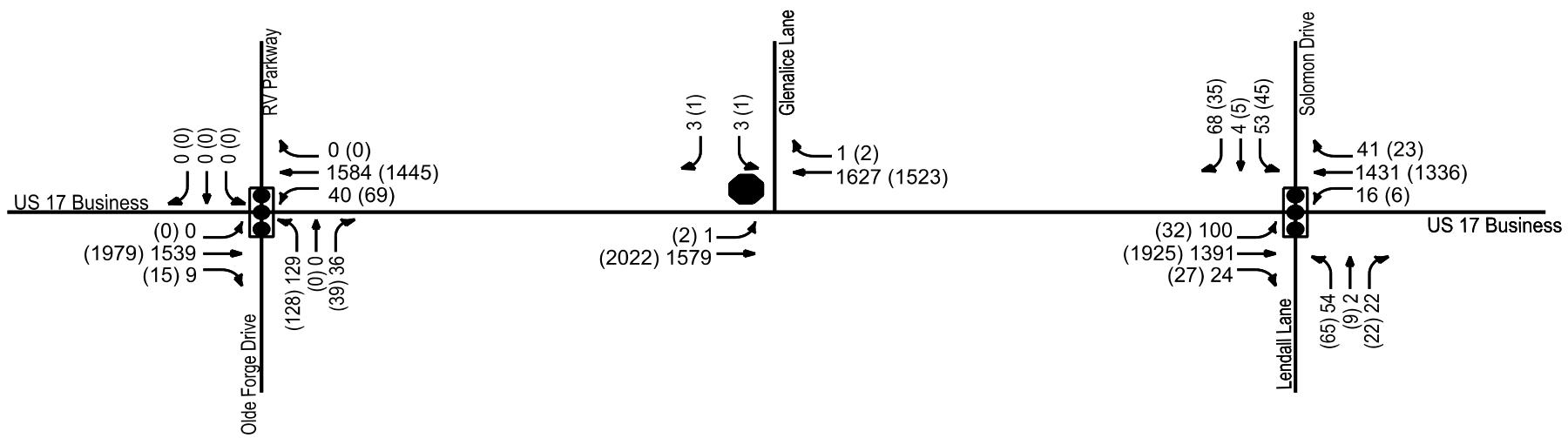


Bowman

**2020 Existing
Peak Hour Traffic Volumes**
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 2

Job # 100254-01-001



DRAWING NOT TO SCALE

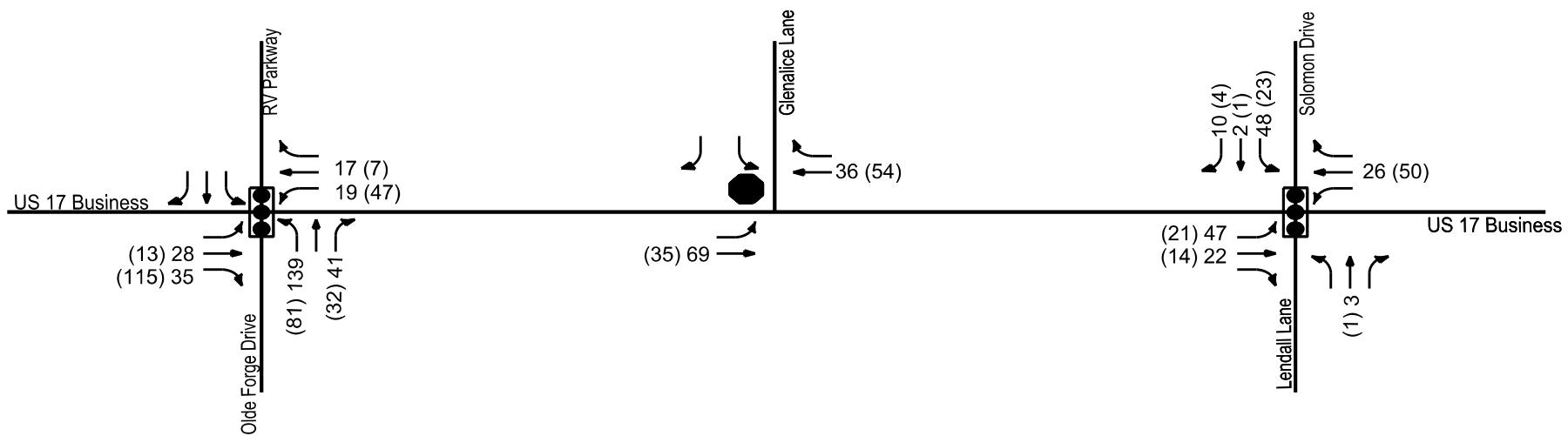


Bowman

**2025 Background
Peak Hour Traffic Volumes**
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 3

Job # 100254-01-001



LEGEND



Traffic Signal

123 : AM Peak Hour Traffic

Stop Sign

(123) : PM Peak Hour Traffic

Represents One
Turning Movement

12% : Entering Distribution

(12%) : Exiting Distribution



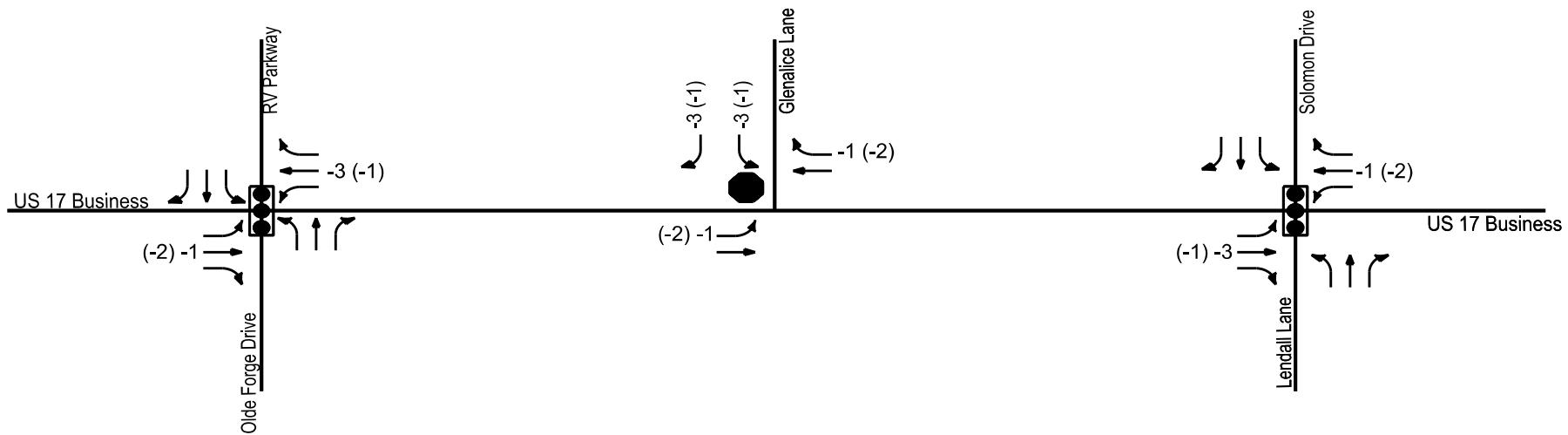
DRAWING NOT TO SCALE

Bowman

**Total Background Development
Peak Hour Traffic Volumes**
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 4

Job # 100254-01-001



LEGEND



Traffic Signal

123 : AM Peak Hour Traffic

Stop Sign

(123) : PM Peak Hour Traffic

Represents One
Turning Movement

12% : Entering Distribution

(12%) : Exiting Distribution



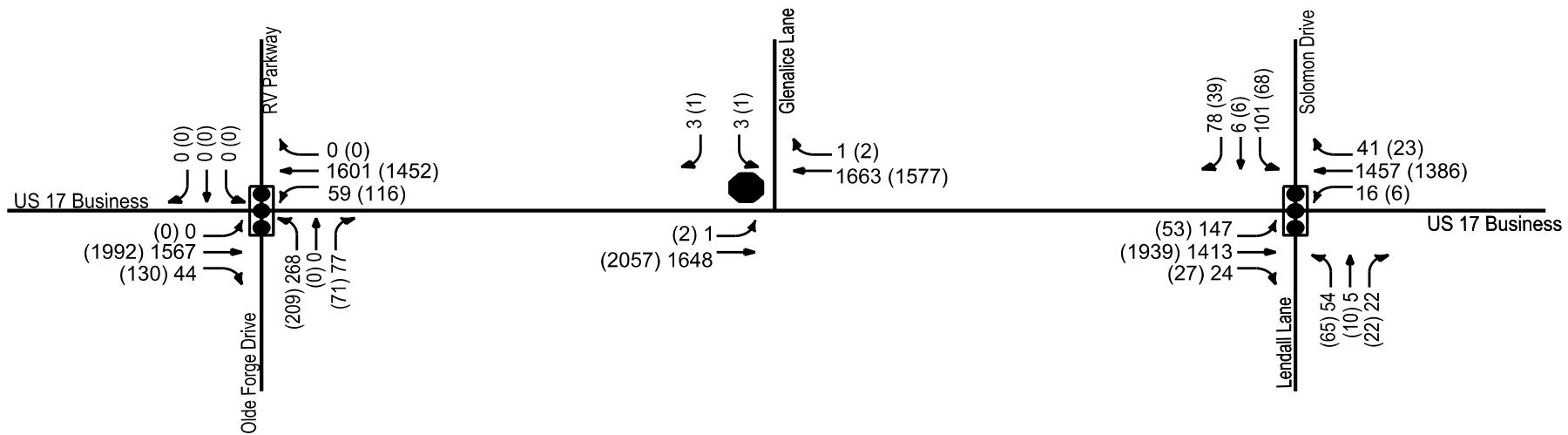
DRAWING NOT TO SCALE

Bowman

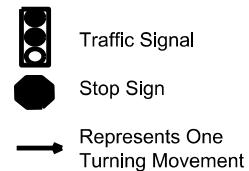
**Existing Glenalice Lane
Trips To Be Removed**
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 5

Job # 100254-01-001



LEGEND



123 : AM Peak Hour Traffic
 (123) : PM Peak Hour Traffic
 12% : Entering Distribution
 (12%) : Exiting Distribution

DRAWING NOT TO SCALE

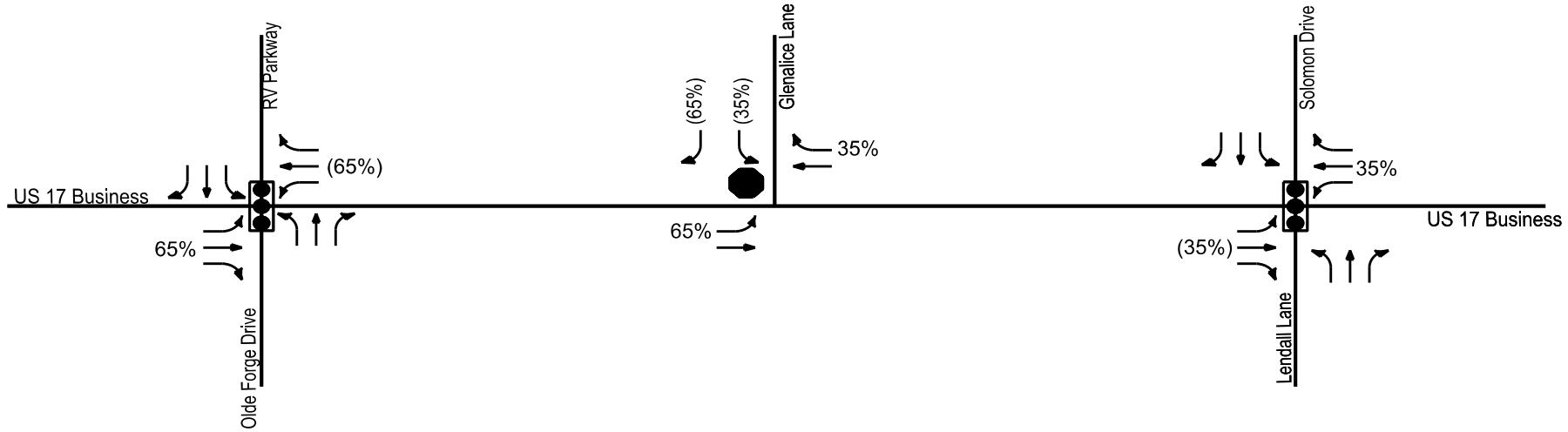


Bowman

2025 No Build
Peak Hour Traffic Volumes
 Warrenton Road (US Route 17 Bus.)
 Stafford County, Virginia

Exhibit 6

Job # 100254-01-001



LEGEND



Traffic Signal

Stop Sign



Represents One
Turning Movement

123 : AM Peak Hour Traffic
(123) : PM Peak Hour Traffic
12% : Entering Distribution
(12%) : Exiting Distribution

DRAWING NOT TO SCALE

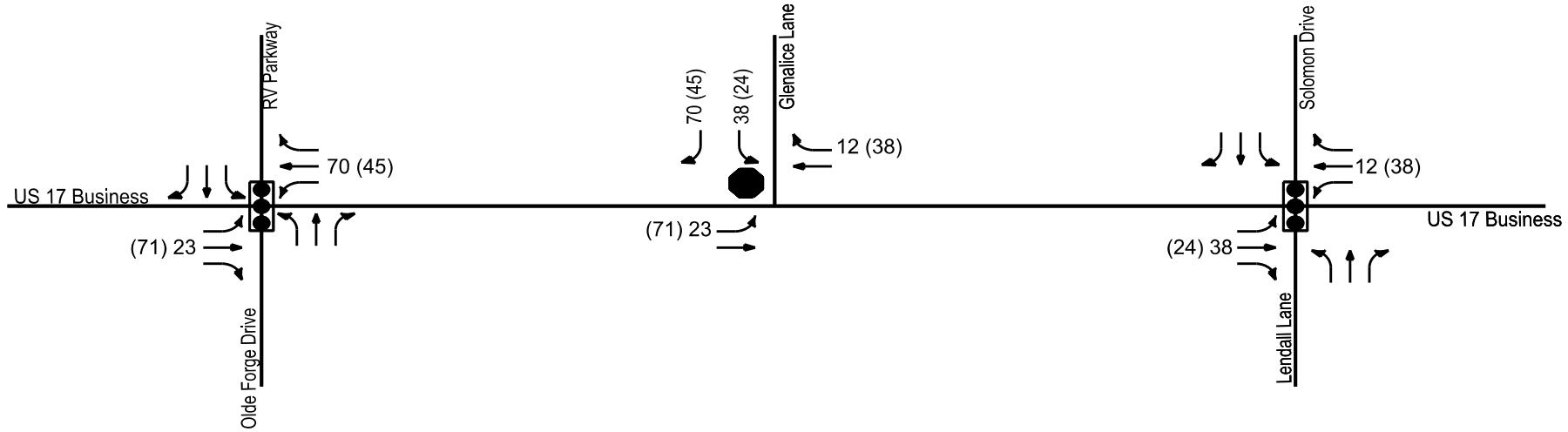


Bowman

Trip Distribution
Warrenton Road (US Route 17 Bus.)
Stafford County, Virginia

Exhibit 7

Job # 100254-01-001



LEGEND



Traffic Signal

123 : AM Peak Hour Traffic
 (123) : PM Peak Hour Traffic
 12% : Entering Distribution
 (12%) : Exiting Distribution



Stop Sign

Represents One
Turning Movement



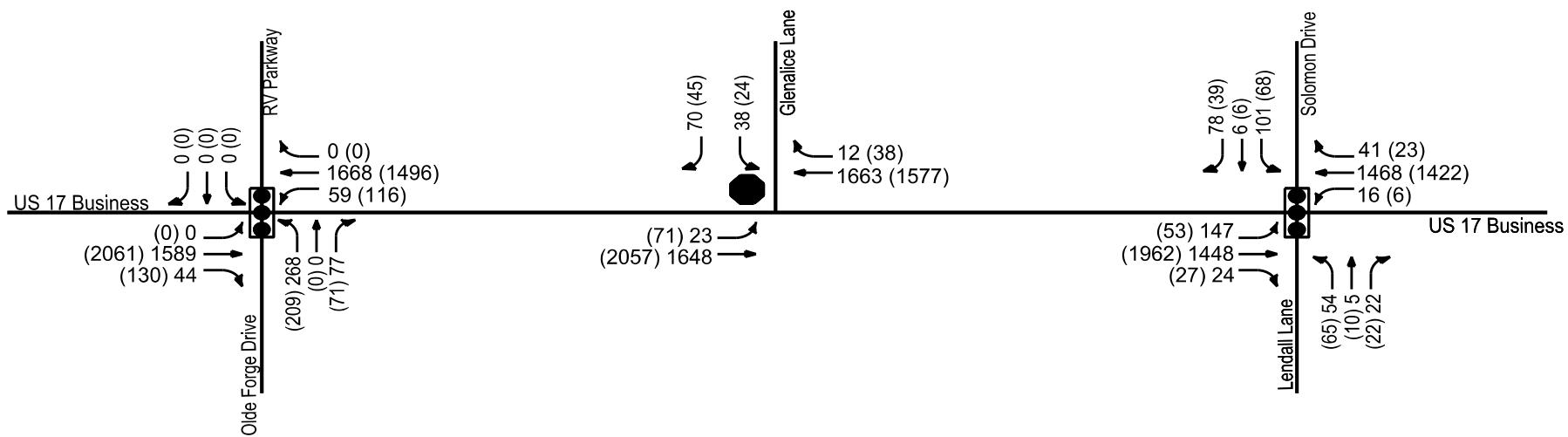
DRAWING NOT TO SCALE

Bowman

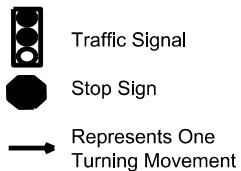
Total Site Trips
 Warrenton Road (US Route 17 Bus.)
 Stafford County, Virginia

Exhibit 8

Job # 100254-01-001



LEGEND



123 : AM Peak Hour Traffic
 (123) : PM Peak Hour Traffic
 12% : Entering Distribution
 (12%) : Exiting Distribution

DRAWING NOT TO SCALE



Bowman

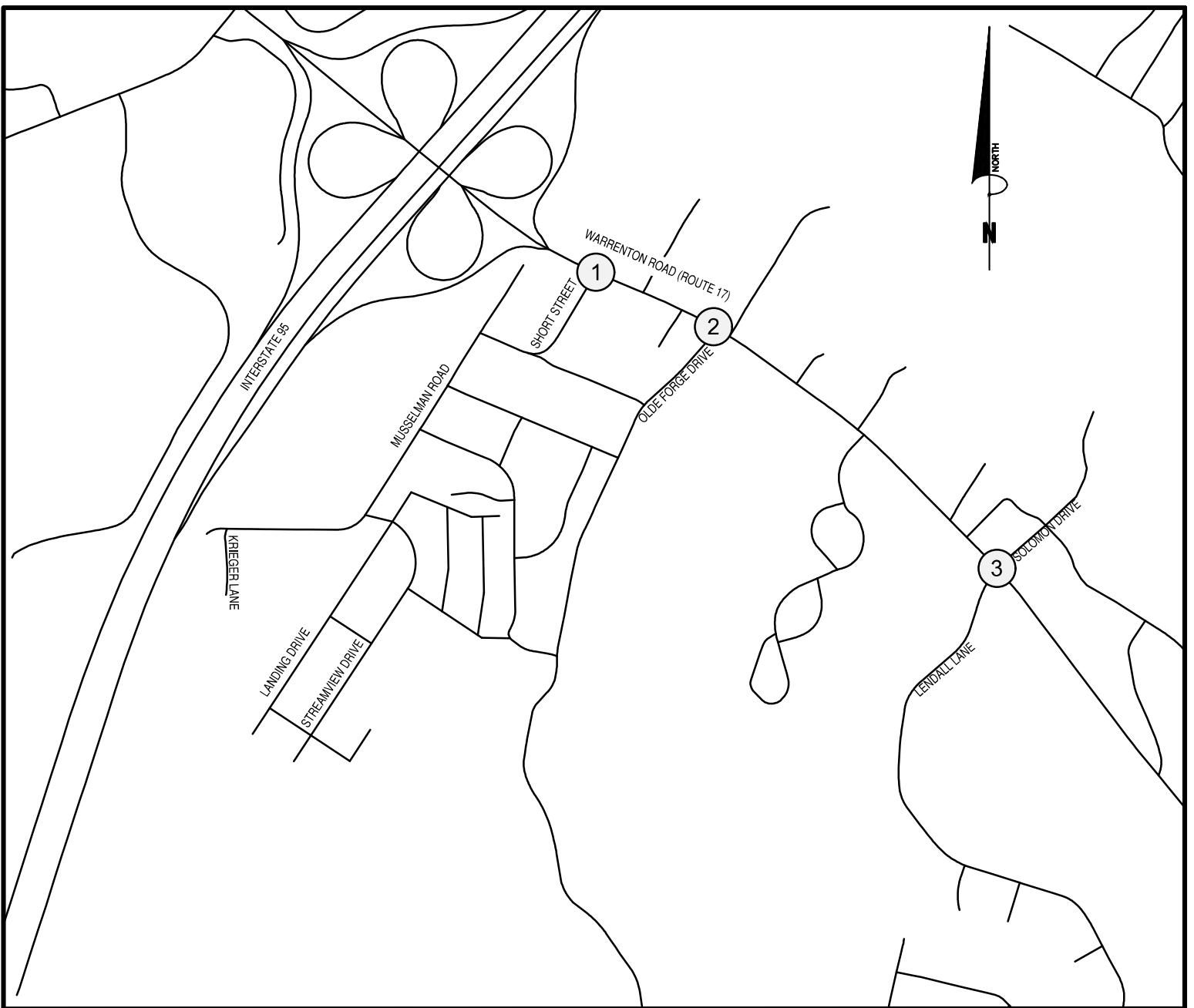
2025 Build
Peak Hour Traffic Volumes
 Warrenton Road (US Route 17 Bus.)
 Stafford County, Virginia

Exhibit 9

Job # 100254-01-001

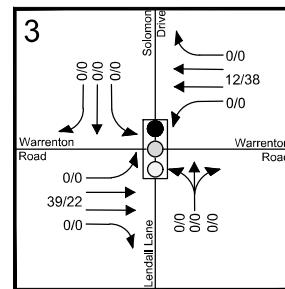
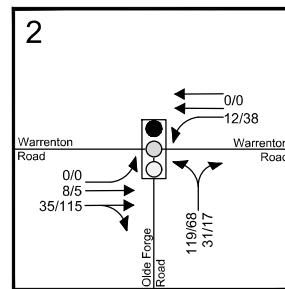
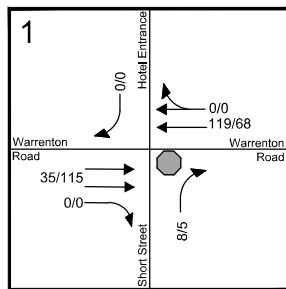


Appendix F: Background Development Traffic Volumes



LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- xx/yy AM/PM Peak Hour Volume

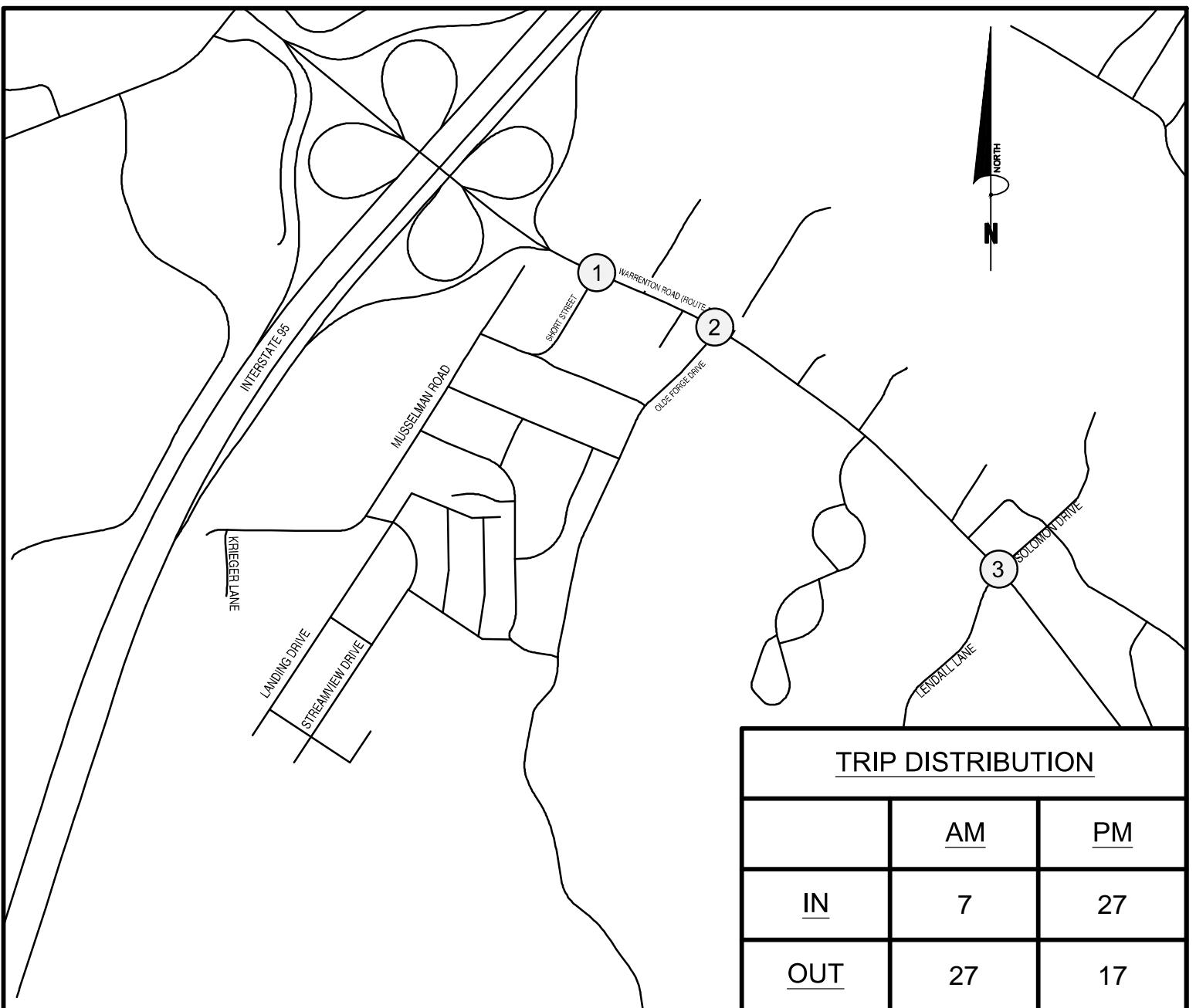


Background Development Trip Generation
Cherryview Landing
Stafford County, Virginia

Bowman
CONSULTING

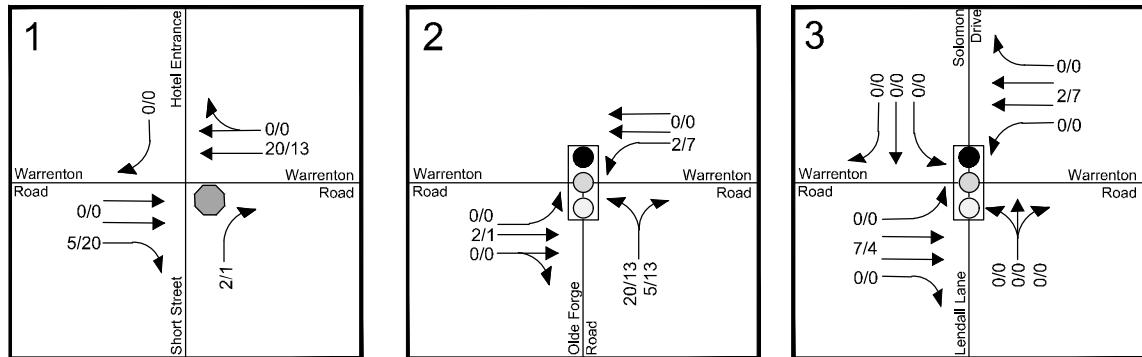
Exhibit 5

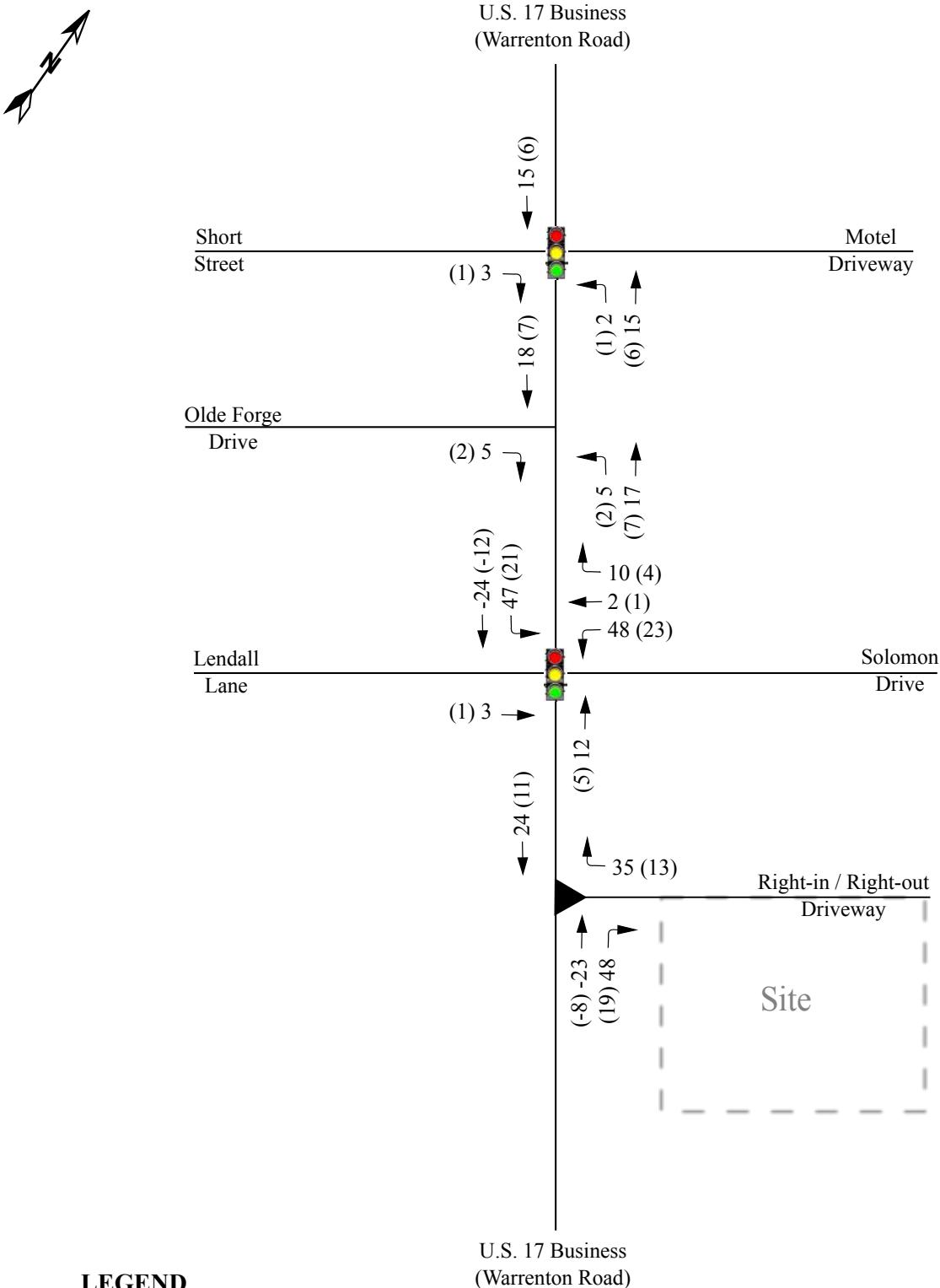
NOT TO SCALE



LEGEND

- Traffic Signal
- Stop Sign
- Represents One Travel Lane
- xx/yy AM/PM Peak Hour Volume





LEGEND

X (Y) AM (PM) Peak Hour



Dunkin' Donuts
Warrenton Road
Stafford County, Virginia

Total Site Trips

Scale: Not to Scale | Figure 10



Appendix G: Existing Conditions (2020) Capacity Analysis

Lanes, Volumes, Timings
2020 Existing

2020 Existing AM

01/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1394	9	40	1434	0	129	0	36	0	0	0
Future Volume (vph)	0	1394	9	40	1434	0	129	0	36	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		1927			1096			921			413	
Travel Time (s)		29.2			16.6			25.1			11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							34%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	12.8	57.4		16.6	61.2		17.0	17.0		9.0	9.0	
Total Split (%)	12.8%	57.4%		16.6%	61.2%		17.0%	17.0%		9.0%	9.0%	
Maximum Green (s)	2.9	50.6		6.7	54.4		9.0	9.0		2.8	2.8	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	C-Min		Min	C-Min		Min	Min		Min	Min	
Act Effect Green (s)	54.6		6.5	57.6		10.9	8.5					
Actuated g/C Ratio	0.55		0.06	0.58		0.11	0.08					
v/c Ratio	0.79		0.38	0.77		0.50	0.20					
Control Delay	21.8		47.5	21.5		52.0	1.0					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	21.8		47.5	21.5		52.0	1.0					
LOS	C		D	C		D	A					
Approach Delay	21.8			22.2			27.2					
Approach LOS	C			C			C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 57 (57%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 22.3

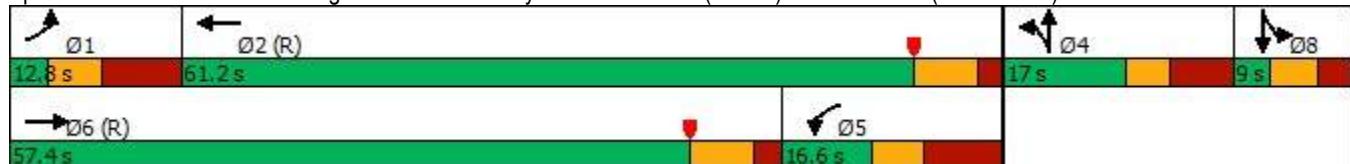
Intersection LOS: C

Intersection Capacity Utilization 54.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



HCM 2010 Signalized Intersection Summary
2020 Existing

2020 Existing AM
01/09/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑↑				
Traffic Volume (veh/h)	0	1394	9	40	1434	0	129	0	36	0	0	0
Future Volume (veh/h)	0	1394	9	40	1434	0	129	0	36	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1515	10	43	1559	0	90	71	39	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	2	1807	12	379	2754	0	188	93	51	0	2	0
Arrive On Green	0.00	0.50	0.46	0.21	0.78	0.00	0.11	0.08	0.11	0.00	0.00	0.00
Sat Flow, veh/h	1783	3622	24	1765	3614	0	1774	1132	622	0	1863	0
Grp Volume(v), veh/h	0	744	781	43	1559	0	90	0	110	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1868	1765	1761	0	1774	0	1753	0	1863	0
Q Serve(g_s), s	0.0	36.0	36.1	2.0	17.3	0.0	4.8	0.0	6.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	36.0	36.1	2.0	17.3	0.0	4.8	0.0	6.1	0.0	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.00	1.00		0.35	0.00		0.00
Lane Grp Cap(c), veh/h	2	887	932	379	2754	0	188	0	144	0	2	0
V/C Ratio(X)	0.00	0.84	0.84	0.11	0.57	0.00	0.48	0.00	0.76	0.00	0.00	0.00
Avail Cap(c_a), veh/h	52	976	1025	379	2754	0	202	0	158	0	52	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	21.6	21.6	31.6	4.3	0.0	42.1	0.0	44.5	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	9.3	8.9	0.1	0.8	0.0	1.9	0.0	18.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	19.8	20.8	1.0	8.6	0.0	2.4	0.0	3.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	30.9	30.5	31.7	5.1	0.0	44.0	0.0	62.7	0.0	0.0	0.0
LnGrp LOS	C	C	C	A		D		E				
Approach Vol, veh/h		1525			1602			200			0	
Approach Delay, s/veh		30.7			5.8			54.3			0.0	
Approach LOS		C			A			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	0.0	83.8		16.2	31.4	52.4		0.0				
Change Period (Y+R _c), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 2.9	* 54		* 9	6.7	* 51		2.8				
Max Q Clear Time (g_c+l1), s	0.0	19.3		8.1	4.0	38.1		0.0				
Green Ext Time (p_c), s	0.0	14.8		0.1	0.0	7.5		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			20.1									
HCM 2010 LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
2020 Existing

2020 Existing AM

01/09/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	1430	1473	1	3	3
Future Volume (vph)	1	1430	1473	1	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 50.7%

ICU Level of Service A

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	1	1430	1473	1	3	3
Future Vol, veh/h	1	1430	1473	1	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	1554	1601	1	3	3

Major/Minor	Major1	Major2	Minor2
-------------	--------	--------	--------

Conflicting Flow All	1602	0	-	0	2381	801
Stage 1	-	-	-	-	1602	-
Stage 2	-	-	-	-	779	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	404	-	-	-	29	327
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	413	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	404	-	-	-	29	327
Mov Cap-2 Maneuver	-	-	-	-	111	-
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	SB
----------	----	----	----

HCM Control Delay, s	0	0	27.6
----------------------	---	---	------

HCM LOS	D
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Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
-----------------------	-----	-----	-----	-----	-------

Capacity (veh/h)	404	-	-	-	166
HCM Lane V/C Ratio	0.003	-	-	-	0.039
HCM Control Delay (s)	13.9	-	-	-	27.6
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lanes, Volumes, Timings
2020 Existing

2020 Existing AM

01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2	1	1	2	1	1	2	1	1	2	1
Traffic Volume (vph)	100	1259	24	16	1296	41	54	2	22	53	4	68
Future Volume (vph)	100	1259	24	16	1296	41	54	2	22	53	4	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			1%			2%	
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	17.0	47.0	47.0	17.0	47.0	47.0	19.0	19.0		17.0	17.0	17.0
Total Split (%)	17.0%	47.0%	47.0%	17.0%	47.0%	47.0%	19.0%	19.0%		17.0%	17.0%	17.0%
Maximum Green (s)	9.1	39.1	39.1	9.1	39.1	39.1	11.8	11.8		9.4	9.4	9.4
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	68.3	63.9	63.9	63.1	53.2	53.2		12.4		11.9	11.9	11.9
Actuated g/C Ratio	0.68	0.64	0.64	0.63	0.53	0.53		0.12		0.12	0.12	0.12
v/c Ratio	0.40	0.65	0.02	0.07	0.81	0.05		0.38		0.29	0.02	0.20
Control Delay	27.9	5.7	0.0	8.6	27.9	0.1		36.7		43.5	38.2	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	27.9	5.7	0.0	8.6	27.9	0.1		36.7		43.5	38.2	1.2
LOS	C	A	A	A	C	A		D		D	D	A
Approach Delay		7.2			26.8			36.7			20.4	
Approach LOS		A			C			D			C	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 17.6

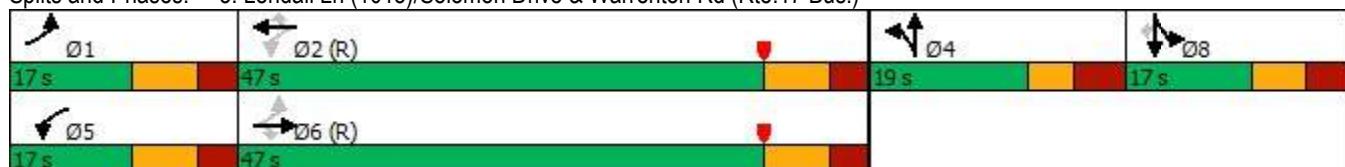
Intersection LOS: B

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



HCM 2010 Signalized Intersection Summary
2020 Existing

2020 Existing AM
01/09/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	6	16	5	2	12	7	4	14	3	8	18
Traffic Volume (veh/h)	100	1259	24	16	1296	41	54	2	22	53	4	68
Future Volume (veh/h)	100	1259	24	16	1296	41	54	2	22	53	4	68
Number	1											
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	114	1431	27	18	1473	47	61	2	25	60	5	77
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	302	2015	928	280	1899	874	114	4	47	179	188	160
Arrive On Green	0.09	0.58	0.58	0.06	0.56	0.56	0.10	0.10	0.06	0.10	0.10	0.10
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1184	39	485	1756	1844	1568
Grp Volume(v), veh/h	114	1431	27	18	1473	47	88	0	0	60	5	77
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1709	0	0	1756	1844	1568
Q Serve(g_s), s	2.4	29.5	0.7	0.4	33.6	1.4	4.9	0.0	0.0	3.2	0.2	4.6
Cycle Q Clear(g_c), s	2.4	29.5	0.7	0.4	33.6	1.4	4.9	0.0	0.0	3.2	0.2	4.6
Prop In Lane	1.00			1.00		1.00	0.69		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	302	2015	928	280	1899	874	164	0	0	179	188	160
V/C Ratio(X)	0.38	0.71	0.03	0.06	0.78	0.05	0.54	0.00	0.00	0.33	0.03	0.48
Avail Cap(c_a), veh/h	379	2015	928	406	1899	874	256	0	0	228	240	204
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.4	14.8	8.8	11.3	17.4	10.2	43.5	0.0	0.0	41.7	40.4	42.4
Incr Delay (d2), s/veh	0.8	2.2	0.1	0.1	3.2	0.1	2.7	0.0	0.0	1.1	0.1	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	14.5	0.3	0.2	16.6	0.6	2.5	0.0	0.0	1.6	0.1	2.1
LnGrp Delay(d),s/veh	16.2	17.0	8.9	11.4	20.6	10.3	46.2	0.0	0.0	42.8	40.5	44.6
LnGrp LOS	B	B	A	B	C	B	D			D	D	D
Approach Vol, veh/h		1572			1538			88			142	
Approach Delay, s/veh		16.8			20.1			46.2			43.7	
Approach LOS		B			C			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	12.7	59.5		13.6	9.9	62.3		14.2				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (Gmax), s	9.1	39.1		* 12	9.1	39.1		9.4				
Max Q Clear Time (g_c+l1), s	4.4	35.6		6.9	2.4	31.5		6.6				
Green Ext Time (p_c), s	0.1	2.7		0.1	0.0	5.1		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			20.2									
HCM 2010 LOS			C									
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3290	3338	3302	3273	3163	3219	3254
Vehs Exited	3289	3335	3299	3278	3210	3219	3240
Starting Vehs	120	110	122	126	167	120	108
Ending Vehs	121	113	125	121	120	120	122
Travel Distance (mi)	3899	3950	3932	3857	3777	3805	3820
Travel Time (hr)	130.6	135.5	133.1	131.6	127.4	129.6	129.5
Total Delay (hr)	41.0	44.7	42.5	43.1	40.4	42.1	41.7
Total Stops	2556	2802	2671	2740	2645	2630	2671
Fuel Used (gal)	127.6	131.0	129.7	128.5	123.8	125.7	126.6

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3264	3337	3196	3264
Vehs Exited	3281	3362	3209	3272
Starting Vehs	119	128	116	121
Ending Vehs	102	103	103	115
Travel Distance (mi)	3890	3982	3800	3871
Travel Time (hr)	134.6	134.8	128.3	131.5
Total Delay (hr)	45.0	43.6	41.0	42.5
Total Stops	2775	2698	2531	2672
Fuel Used (gal)	129.6	132.0	124.9	127.9

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Int 1

Start Time 7:30

End Time 7:45

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	928	901	915	858	857	925	856
Vehs Exited	888	856	886	839	896	887	817
Starting Vehs	120	110	122	126	167	120	108
Ending Vehs	160	155	151	145	128	158	147
Travel Distance (mi)	1091	1038	1081	997	1062	1099	1006
Travel Time (hr)	36.8	36.4	38.5	34.8	37.7	38.9	34.2
Total Delay (hr)	11.8	12.5	13.6	11.8	13.2	13.7	11.1
Total Stops	714	772	806	721	805	798	687
Fuel Used (gal)	36.2	34.4	36.7	33.2	35.4	37.0	33.2

Interval #1 Information Int 1

Start Time 7:30

End Time 7:45

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	884	926	891	894
Vehs Exited	868	903	871	872
Starting Vehs	119	128	116	121
Ending Vehs	135	151	136	146
Travel Distance (mi)	1061	1097	1053	1059
Travel Time (hr)	37.0	37.6	38.0	37.0
Total Delay (hr)	12.6	12.5	13.9	12.7
Total Stops	766	757	814	765
Fuel Used (gal)	35.2	36.5	35.9	35.4

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	799	810	777	789	747	791	781
Vehs Exited	849	843	801	821	771	845	807
Starting Vehs	160	155	151	145	128	158	147
Ending Vehs	110	122	127	113	104	104	121
Travel Distance (mi)	976	969	942	967	900	948	910
Travel Time (hr)	33.8	33.3	31.3	33.7	29.7	32.8	31.8
Total Delay (hr)	11.4	11.0	9.6	11.5	9.0	10.8	10.8
Total Stops	706	695	618	718	606	664	705
Fuel Used (gal)	32.6	32.8	30.4	32.6	29.7	31.4	30.4

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	754	806	771	782
Vehs Exited	789	824	797	814
Starting Vehs	135	151	136	146
Ending Vehs	100	133	110	112
Travel Distance (mi)	915	959	921	941
Travel Time (hr)	31.6	32.8	31.4	32.2
Total Delay (hr)	10.5	10.9	10.1	10.6
Total Stops	658	668	624	666
Fuel Used (gal)	30.2	32.2	30.7	31.3

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	772	810	808	804	766	741	792
Vehs Exited	771	813	803	799	756	721	801
Starting Vehs	110	122	127	113	104	104	121
Ending Vehs	111	119	132	118	114	124	112
Travel Distance (mi)	907	989	953	924	893	853	954
Travel Time (hr)	29.6	33.1	32.0	30.6	28.9	28.0	31.4
Total Delay (hr)	8.6	10.4	10.1	9.5	8.4	8.3	9.4
Total Stops	541	642	644	655	549	572	596
Fuel Used (gal)	29.1	32.3	31.5	30.3	28.5	27.6	31.3

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	822	823	787	794
Vehs Exited	787	836	780	787
Starting Vehs	100	133	110	112
Ending Vehs	135	120	117	120
Travel Distance (mi)	950	996	945	936
Travel Time (hr)	33.1	33.1	30.6	31.0
Total Delay (hr)	11.2	10.4	8.9	9.5
Total Stops	676	651	576	608
Fuel Used (gal)	31.6	33.0	30.2	30.5

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	791	817	802	822	793	762	825
Vehs Exited	781	823	809	819	787	766	815
Starting Vehs	111	119	132	118	114	124	112
Ending Vehs	121	113	125	121	120	120	122
Travel Distance (mi)	925	955	957	969	922	903	951
Travel Time (hr)	30.4	32.7	31.3	32.5	31.1	30.0	32.2
Total Delay (hr)	9.2	10.7	9.2	10.3	9.8	9.3	10.3
Total Stops	595	693	603	646	685	596	683
Fuel Used (gal)	29.7	31.4	31.1	32.4	30.2	29.7	31.7

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	804	782	747	792
Vehs Exited	837	799	761	800
Starting Vehs	135	120	117	120
Ending Vehs	102	103	103	115
Travel Distance (mi)	964	930	881	936
Travel Time (hr)	32.9	31.2	28.4	31.3
Total Delay (hr)	10.7	9.8	7.9	9.7
Total Stops	675	622	517	631
Fuel Used (gal)	32.6	30.3	28.1	30.7

Queuing and Blocking Report
2020 Existing

2020 Existing AM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	427	421	62	364	371	132	115
Average Queue (ft)	252	243	5	194	222	73	44
95th Queue (ft)	372	370	39	336	352	119	89
Link Distance (ft)	1890	1890		935	935	874	874
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	31			1			
Queuing Penalty (veh)	0			0			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (ft)	11	36
Average Queue (ft)	0	7
95th Queue (ft)	4	28
Link Distance (ft)		695
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	124	211	205	61	106	365	372	122	134	108	36	86
Average Queue (ft)	44	75	78	4	12	171	163	7	57	45	6	36
95th Queue (ft)	95	172	176	29	56	314	312	74	108	89	25	70
Link Distance (ft)		1625	1625			2215	2215			526		674
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		170			50	105		260		125		140
Storage Blk Time (%)		0	1	13	0		17	2	0		0	
Queuing Penalty (veh)		1	1	3	0		3	1	0		0	

Network Summary

Network wide Queuing Penalty: 9

Lanes, Volumes, Timings
2020 Existing

2020 Existing PM

01/09/2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	0	1792	15	69	1308	0	128	0	39	0	0	0
Future Volume (vph)	0	1792	15	69	1308	0	128	0	39	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		1927			1096			921			413	
Travel Time (s)		29.2			16.6			25.1			11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							33%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	13.0	62.0		12.0	61.0		17.2	17.2		8.8	8.8	
Total Split (%)	13.0%	62.0%		12.0%	61.0%		17.2%	17.2%		8.8%	8.8%	
Maximum Green (s)	3.1	55.2		2.1	54.2		9.2	9.2		2.6	2.6	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	C-Min		Min	C-Min		Min	Min		Min	Min	
Act Effect Green (s)	59.5		2.1	58.5		11.0	8.6					
Actuated g/C Ratio	0.60		0.02	0.58		0.11	0.09					
v/c Ratio	0.93		2.08	0.69		0.50	0.20					
Control Delay	27.9		578.6	18.6		51.7	1.0					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	27.9		578.6	18.6		51.7	1.0					
LOS	C		F	B		D	A					
Approach Delay	27.9			46.7			27.1					
Approach LOS	C			D			C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 57 (57%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 2.08

Intersection Signal Delay: 35.6

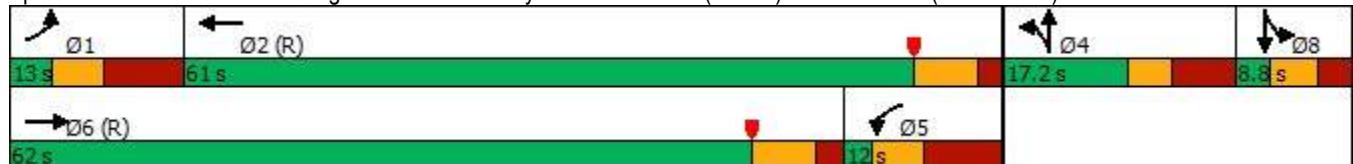
Intersection LOS: D

Intersection Capacity Utilization 72.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑				
Traffic Volume (veh/h)	0	1792	15	69	1308	0	128	0	39	0	0	0
Future Volume (veh/h)	0	1792	15	69	1308	0	128	0	39	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1948	16	75	1422	0	90	68	42	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	2	2126	17	221	2752	0	189	89	55	0	2	0
Arrive On Green	0.00	0.59	0.55	0.13	0.78	0.00	0.11	0.08	0.11	0.00	0.00	0.00
Sat Flow, veh/h	1783	3616	30	1765	3614	0	1774	1079	666	0	1863	0
Grp Volume(v), veh/h	0	957	1007	75	1422	0	90	0	110	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1867	1765	1761	0	1774	0	1745	0	1863	0
Q Serve(g_s), s	0.0	48.0	48.3	3.9	14.8	0.0	4.8	0.0	6.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	48.0	48.3	3.9	14.8	0.0	4.8	0.0	6.2	0.0	0.0	0.0
Prop In Lane	1.00			1.00		0.00	1.00		0.38	0.00		0.00
Lane Grp Cap(c), veh/h	2	1046	1098	221	2752	0	189	0	144	0	2	0
V/C Ratio(X)	0.00	0.91	0.92	0.34	0.52	0.00	0.48	0.00	0.76	0.00	0.00	0.00
Avail Cap(c_a), veh/h	55	1058	1111	221	2752	0	206	0	161	0	48	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	18.4	18.5	39.9	4.0	0.0	42.1	0.0	44.5	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	13.6	13.4	0.9	0.7	0.0	1.9	0.0	17.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	27.4	28.7	2.0	7.4	0.0	2.4	0.0	3.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	32.0	31.9	40.8	4.7	0.0	43.9	0.0	62.1	0.0	0.0	0.0
LnGrp LOS	C	C	D	A		D		E				
Approach Vol, veh/h		1964			1497			200			0	
Approach Delay, s/veh		31.9			6.5			53.9			0.0	
Approach LOS		C			A			D				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	0.0	83.8		16.2	22.4	61.3		0.0				
Change Period (Y+R _c), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 3.1	* 54		* 9.2	2.1	* 55		2.6				
Max Q Clear Time (g_c+l1), s	0.0	16.8		8.2	5.9	50.3		0.0				
Green Ext Time (p_c), s	0.0	13.1		0.1	0.0	4.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				22.7								
HCM 2010 LOS				C								
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
2020 Existing

2020 Existing PM

01/09/2020



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	1830	1379	2	1	1
Future Volume (vph)	2	1830	1379	2	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 60.6%

ICU Level of Service B

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	2	1830	1379	2	1	1
Future Vol, veh/h	2	1830	1379	2	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	1989	1499	2	1	1

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	1501	0	-	0	2499	751
Stage 1	-	-	-	-	1500	-
Stage 2	-	-	-	-	999	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	442	-	-	-	24	353
Stage 1	-	-	-	-	171	-
Stage 2	-	-	-	-	317	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	442	-	-	-	24	353
Mov Cap-2 Maneuver	-	-	-	-	111	-
Stage 1	-	-	-	-	170	-
Stage 2	-	-	-	-	317	-

Approach	EB	WB	SB
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HCM Control Delay, s	0	0	26.6
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HCM LOS	D
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Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
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Capacity (veh/h)	442	-	-	-	169
HCM Lane V/C Ratio	0.005	-	-	-	0.013
HCM Control Delay (s)	13.2	-	-	-	26.6
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0

Lanes, Volumes, Timings
2020 Existing

2020 Existing PM

01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	1743	27	6	1209	23	65	9	22	45	5	35
Future Volume (vph)	32	1743	27	6	1209	23	65	9	22	45	5	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%				1%			2%
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	14.0	54.0	54.0	14.0	54.0	54.0	17.0	17.0		15.0	15.0	15.0
Total Split (%)	14.0%	54.0%	54.0%	14.0%	54.0%	54.0%	17.0%	17.0%		15.0%	15.0%	15.0%
Maximum Green (s)	6.1	46.1	46.1	6.1	46.1	46.1	9.8	9.8		7.4	7.4	7.4
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	67.0	65.0	65.0	65.3	59.4	59.4	12.2		10.6	10.6	10.6	
Actuated g/C Ratio	0.67	0.65	0.65	0.65	0.59	0.59	0.12		0.11	0.11	0.11	
v/c Ratio	0.13	0.88	0.03	0.03	0.68	0.03	0.49		0.28	0.03	0.11	
Control Delay	0.9	7.6	0.0	6.8	18.8	0.0	44.1		45.1	40.2	0.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	0.9	7.6	0.0	6.8	18.8	0.0	44.1		45.1	40.2	0.6	
LOS	A	A	A	A	B	A	D		D	D	A	
Approach Delay		7.4			18.4		44.1			26.5		
Approach LOS		A			B		D			C		
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 13.2

Intersection LOS: B

Intersection Capacity Utilization 66.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



HCM 2010 Signalized Intersection Summary
2020 Existing

2020 Existing PM
01/09/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1743	27	6	1209	23	65	9	22	45	5	35
Future Volume (veh/h)	32	1743	27	6	1209	23	65	9	22	45	5	35
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	36	1981	31	7	1374	26	74	10	25	51	6	40
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	311	2076	956	170	1977	910	127	17	43	145	152	130
Arrive On Green	0.07	0.60	0.60	0.05	0.58	0.58	0.11	0.11	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1171	158	396	1756	1844	1568
Grp Volume(v), veh/h	36	1981	31	7	1374	26	109	0	0	51	6	40
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1725	0	0	1756	1844	1568
Q Serve(g_s), s	0.7	53.7	0.8	0.1	28.3	0.7	6.0	0.0	0.0	2.7	0.3	2.4
Cycle Q Clear(g_c), s	0.7	53.7	0.8	0.1	28.3	0.7	6.0	0.0	0.0	2.7	0.3	2.4
Prop In Lane	1.00		1.00	1.00		1.00	0.68		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	311	2076	956	170	1977	910	188	0	0	145	152	130
V/C Ratio(X)	0.12	0.95	0.03	0.04	0.70	0.03	0.58	0.00	0.00	0.35	0.04	0.31
Avail Cap(c_a), veh/h	364	2076	956	262	1977	910	224	0	0	193	203	172
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.7	18.7	8.1	20.7	14.9	9.1	42.7	0.0	0.0	43.3	42.2	43.2
Incr Delay (d2), s/veh	0.2	11.6	0.1	0.1	2.0	0.1	2.8	0.0	0.0	1.4	0.1	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	28.7	0.4	0.1	13.9	0.3	3.0	0.0	0.0	1.4	0.2	1.1
LnGrp Delay(d),s/veh	10.9	30.3	8.2	20.8	16.9	9.1	45.6	0.0	0.0	44.8	42.3	44.5
LnGrp LOS	B	C	A	C	B	A	D			D	D	D
Approach Vol, veh/h		2048			1407			109			97	
Approach Delay, s/veh		29.6			16.8			45.6			44.5	
Approach LOS		C			B			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	11.1	61.8		14.9	8.8	64.1		12.3				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (G _{max}), s	6.1	46.1		* 9.8	6.1	46.1		7.4				
Max Q Clear Time (g _{c+l1}), s	2.7	30.3		8.0	2.1	55.7		4.7				
Green Ext Time (p _c), s	0.0	8.4		0.0	0.0	0.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			25.6									
HCM 2010 LOS			C									
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3575	3509	3574	3605	3538	3494	3438
Vehs Exited	3585	3520	3578	3595	3515	3460	3429
Starting Vehs	159	168	161	142	143	125	125
Ending Vehs	149	157	157	152	166	159	134
Travel Distance (mi)	4300	4222	4301	4304	4233	4187	4130
Travel Time (hr)	154.7	143.4	155.6	147.6	148.8	142.3	140.1
Total Delay (hr)	56.1	46.8	57.0	49.3	52.1	46.6	45.2
Total Stops	3250	2733	3410	2987	3086	2731	2728
Fuel Used (gal)	143.3	137.9	144.0	141.4	139.4	136.7	134.7

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3514	3584	3644	3548
Vehs Exited	3505	3571	3647	3538
Starting Vehs	142	140	142	141
Ending Vehs	151	153	139	151
Travel Distance (mi)	4214	4260	4390	4254
Travel Time (hr)	154.7	153.0	161.5	150.2
Total Delay (hr)	58.1	55.4	61.1	52.8
Total Stops	3480	3016	3499	3091
Fuel Used (gal)	140.8	143.2	147.8	140.9

Interval #0 Information Seeding

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	865	868	901	936	899	830	812
Vehs Exited	896	892	914	891	879	853	826
Starting Vehs	159	168	161	142	143	125	125
Ending Vehs	128	144	148	187	163	102	111
Travel Distance (mi)	1062	1063	1098	1068	1064	1021	995
Travel Time (hr)	37.7	36.9	39.6	37.2	38.2	33.6	33.8
Total Delay (hr)	13.2	12.7	14.4	12.7	13.9	10.2	11.0
Total Stops	778	672	868	770	816	595	694
Fuel Used (gal)	35.2	35.3	36.8	35.4	35.1	32.7	32.4

Interval #1 Information Int 1

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	931	874	902	883
Vehs Exited	898	862	908	882
Starting Vehs	142	140	142	141
Ending Vehs	175	152	136	142
Travel Distance (mi)	1077	1025	1094	1057
Travel Time (hr)	40.4	37.4	40.0	37.5
Total Delay (hr)	15.8	13.9	15.0	13.3
Total Stops	939	768	840	772
Fuel Used (gal)	36.5	34.6	36.8	35.1

Interval #2 Information Int 2

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	888	847	891	871	829	890	902
Vehs Exited	904	857	895	930	876	847	868
Starting Vehs	128	144	148	187	163	102	111
Ending Vehs	112	134	144	128	116	145	145
Travel Distance (mi)	1075	1028	1070	1100	1037	1044	1060
Travel Time (hr)	37.4	34.3	39.8	37.7	35.2	35.0	36.2
Total Delay (hr)	12.7	10.9	15.3	12.7	11.6	11.1	11.9
Total Stops	757	658	925	746	674	649	695
Fuel Used (gal)	35.5	33.6	35.9	36.2	33.6	33.8	34.4

Interval #2 Information Int 2

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	825	894	917	873
Vehs Exited	900	894	886	885
Starting Vehs	175	152	136	142
Ending Vehs	100	152	167	132
Travel Distance (mi)	1045	1075	1061	1059
Travel Time (hr)	38.5	37.7	37.1	36.9
Total Delay (hr)	14.6	13.2	12.8	12.7
Total Stops	876	724	739	744
Fuel Used (gal)	34.9	35.9	35.2	34.9

Interval #3 Information Int 3

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	943	895	880	912	909	899	874
Vehs Exited	898	894	868	895	850	907	866
Starting Vehs	112	134	144	128	116	145	145
Ending Vehs	157	135	156	145	175	137	153
Travel Distance (mi)	1094	1077	1052	1089	1042	1090	1047
Travel Time (hr)	38.5	36.0	36.0	37.4	36.0	37.4	35.5
Total Delay (hr)	13.4	11.4	11.9	12.7	12.1	12.5	11.5
Total Stops	801	689	712	768	745	702	689
Fuel Used (gal)	36.5	35.0	34.6	35.7	34.1	35.7	34.0

Interval #3 Information Int 3

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	894	914	912	901
Vehs Exited	856	924	913	888
Starting Vehs	100	152	167	132
Ending Vehs	138	142	166	148
Travel Distance (mi)	1056	1120	1112	1078
Travel Time (hr)	39.6	40.4	43.7	38.1
Total Delay (hr)	15.3	14.8	18.4	13.4
Total Stops	890	775	1071	785
Fuel Used (gal)	35.2	37.4	37.9	35.6

Interval #4 Information Int 4

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	879	899	902	886	901	875	850
Vehs Exited	887	877	901	879	910	853	869
Starting Vehs	157	135	156	145	175	137	153
Ending Vehs	149	157	157	152	166	159	134
Travel Distance (mi)	1069	1054	1081	1046	1090	1032	1028
Travel Time (hr)	41.1	36.1	40.2	35.3	39.4	36.4	34.5
Total Delay (hr)	16.8	11.9	15.4	11.2	14.5	12.8	10.9
Total Stops	914	714	905	703	851	785	650
Fuel Used (gal)	36.1	34.0	36.6	34.2	36.6	34.5	33.9

Interval #4 Information Int 4

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	864	902	913	886
Vehs Exited	851	891	940	887
Starting Vehs	138	142	166	148
Ending Vehs	151	153	139	151
Travel Distance (mi)	1036	1040	1123	1060
Travel Time (hr)	36.1	37.5	40.7	37.7
Total Delay (hr)	12.4	13.5	15.0	13.4
Total Stops	775	749	849	791
Fuel Used (gal)	34.2	35.2	37.9	35.3

Queuing and Blocking Report
2020 Existing

2020 Existing PM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	617	607	190	324	348	147	123
Average Queue (ft)	364	360	53	192	219	74	49
95th Queue (ft)	591	587	158	294	317	126	98
Link Distance (ft)	1890	1890		935	935	874	874
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	35			0			
Queuing Penalty (veh)	0			0			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (ft)	27	28
Average Queue (ft)	2	1
95th Queue (ft)	12	12
Link Distance (ft)		695
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	106	298	291	70	31	269	286	6	149	91	34	59
Average Queue (ft)	17	142	144	8	3	125	117	0	68	37	6	23
95th Queue (ft)	59	243	240	42	20	231	231	4	125	75	25	52
Link Distance (ft)		1625	1625			2215	2215		526		674	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		170			50	105		260		125		140
Storage Blk Time (%)			4	22	0		8	0		0		
Queuing Penalty (veh)			1	6	0		1	0		0		

Network Summary

Network wide Queuing Penalty: 8



Appendix H: No Build Conditions (2025) Capacity Analysis

Lanes, Volumes, Timings
2025 No Build

2025 No Build AM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1567	44	59	1601	0	268	0	77	0	0	0
Future Volume (vph)	0	1567	44	59	1601	0	268	0	77	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25				25
Link Distance (ft)		1927			1096			921				413
Travel Time (s)		29.2			16.6			25.1				11.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							34%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	11.9	57.0		11.9	57.0		22.3	22.3		8.8	8.8	
Total Split (%)	11.9%	57.0%		11.9%	57.0%		22.3%	22.3%		8.8%	8.8%	
Maximum Green (s)	2.0	50.2		2.0	50.2		14.3	14.3		2.6	2.6	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	C-Min		Min	C-Min		Min	Min		Min	Min	
Act Effct Green (s)	54.4		2.2	54.5		16.0	13.6					
Actuated g/C Ratio	0.54		0.02	0.54		0.16	0.14					
v/c Ratio	0.91		1.68	0.91		0.72	0.37					
Control Delay	28.8		388.7	28.9		55.6	2.1					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	28.8		388.7	28.9		55.6	2.1					
LOS	C		F	C		E	A					
Approach Delay	28.8			41.6			29.5					
Approach LOS		C		D			C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 51 (51%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.68

Intersection Signal Delay: 34.8

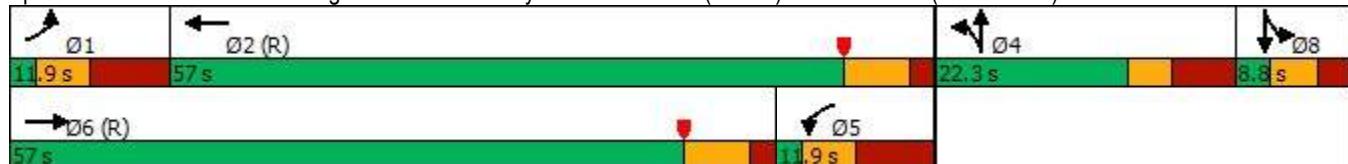
Intersection LOS: C

Intersection Capacity Utilization 68.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑↑				
Traffic Volume (veh/h)	0	1567	44	59	1601	0	268	0	77	0	0	0
Future Volume (veh/h)	0	1567	44	59	1601	0	268	0	77	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1703	48	64	1740	0	188	145	84	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	2	1893	53	207	2539	0	296	158	92	0	2	0
Arrive On Green	0.00	0.54	0.49	0.12	0.72	0.00	0.17	0.14	0.17	0.00	0.00	0.00
Sat Flow, veh/h	1783	3534	99	1765	3614	0	1774	1108	642	0	1863	0
Grp Volume(v), veh/h	0	855	896	64	1740	0	188	0	229	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1855	1765	1761	0	1774	0	1749	0	1863	0
Q Serve(g_s), s	0.0	42.9	43.5	3.3	27.2	0.0	9.9	0.0	12.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	42.9	43.5	3.3	27.2	0.0	9.9	0.0	12.9	0.0	0.0	0.0
Prop In Lane	1.00			1.00		0.00	1.00		0.37	0.00		0.00
Lane Grp Cap(c), veh/h	2	953	994	207	2539	0	296	0	250	0	2	0
V/C Ratio(X)	0.00	0.90	0.90	0.31	0.69	0.00	0.63	0.00	0.92	0.00	0.00	0.00
Avail Cap(c_a), veh/h	36	969	1011	207	2539	0	296	0	250	0	48	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	20.7	21.0	40.4	7.7	0.0	38.8	0.0	41.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	12.9	12.9	0.8	1.5	0.0	4.4	0.0	35.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	24.3	25.7	1.7	13.6	0.0	5.2	0.0	8.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	33.6	33.9	41.3	9.2	0.0	43.2	0.0	76.9	0.0	0.0	0.0
LnGrp LOS	C	C	D	A		D		E				
Approach Vol, veh/h		1751			1804			417			0	
Approach Delay, s/veh		33.7			10.4			61.7			0.0	
Approach LOS		C			B			E				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	0.0	77.7		22.3	21.6	56.1		0.0				
Change Period (Y+R _c), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 2	* 50		* 14	2.0	* 50		2.6				
Max Q Clear Time (g_c+l1), s	0.0	29.2		14.9	5.3	45.5		0.0				
Green Ext Time (p_c), s	0.0	13.0		0.0	0.0	3.8		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			26.1									
HCM 2010 LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	1648	1663	1	3	3
Future Volume (vph)	1	1648	1663	1	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 56.0%

ICU Level of Service B

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	1648	1663	1	3	3
Future Vol, veh/h	1	1648	1663	1	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	1791	1808	1	3	3

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	1809	0	-	0	2707	905
Stage 1	-	-	-	-	1809	-
Stage 2	-	-	-	-	898	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	336	-	-	-	17	279
Stage 1	-	-	-	-	116	-
Stage 2	-	-	-	-	358	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	336	-	-	-	17	279
Mov Cap-2 Maneuver	-	-	-	-	85	-
Stage 1	-	-	-	-	116	-
Stage 2	-	-	-	-	358	-

Approach	EB	WB	SB			
HCM Control Delay, s	0	0	34.2			
HCM LOS			D			

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	336	-	-	-	130	
HCM Lane V/C Ratio	0.003	-	-	-	0.05	
HCM Control Delay (s)	15.7	-	-	-	34.2	
HCM Lane LOS	C	-	-	-	D	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Lanes, Volumes, Timings
2025 No Build

2025 No Build AM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2	1	1	2	1	1	2	1	1	2	1
Traffic Volume (vph)	147	1413	24	16	1457	41	54	5	22	101	6	78
Future Volume (vph)	147	1413	24	16	1457	41	54	5	22	101	6	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			1%			2%	
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	13.4	60.5	60.5	12.9	60.0	60.0	12.6	12.6		14.0	14.0	14.0
Total Split (%)	13.4%	60.5%	60.5%	12.9%	60.0%	60.0%	12.6%	12.6%		14.0%	14.0%	14.0%
Maximum Green (s)	5.5	52.6	52.6	5.0	52.1	52.1	5.4	5.4		6.4	6.4	6.4
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	70.3	66.5	66.5	67.0	58.0	58.0	8.7		10.3	10.3	10.3	
Actuated g/C Ratio	0.70	0.66	0.66	0.67	0.58	0.58	0.09		0.10	0.10	0.10	
v/c Ratio	0.68	0.70	0.02	0.07	0.83	0.05	0.56		0.64	0.04	0.25	
Control Delay	46.4	3.2	0.0	5.5	22.7	0.1	50.7		60.7	41.3	1.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	46.4	3.2	0.0	5.5	22.7	0.1	50.7		60.7	41.3	1.7	
LOS	D	A	A	A	C	A	D		E	D	A	
Approach Delay		7.1			21.9		50.7			35.1		
Approach LOS		A			C		D			D		

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 16.4

Intersection LOS: B

Intersection Capacity Utilization 69.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	147	1413	24	16	1457	41	54	5	22	101	6	78
Future Volume (veh/h)	147	1413	24	16	1457	41	54	5	22	101	6	78
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	167	1606	27	18	1656	47	61	6	25	115	7	89
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	280	2057	947	250	1920	884	98	10	40	176	184	157
Arrive On Green	0.09	0.60	0.60	0.06	0.56	0.56	0.09	0.09	0.05	0.10	0.10	0.10
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1137	112	466	1756	1844	1568
Grp Volume(v), veh/h	167	1606	27	18	1656	47	92	0	0	115	7	89
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1714	0	0	1756	1844	1568
Q Serve(g_s), s	3.4	35.1	0.7	0.4	41.2	1.3	5.2	0.0	0.0	6.3	0.3	5.4
Cycle Q Clear(g_c), s	3.4	35.1	0.7	0.4	41.2	1.3	5.2	0.0	0.0	6.3	0.3	5.4
Prop In Lane	1.00		1.00	1.00		1.00	0.66		0.27	1.00		1.00
Lane Grp Cap(c), veh/h	280	2057	947	250	1920	884	147	0	0	176	184	157
V/C Ratio(X)	0.60	0.78	0.03	0.07	0.86	0.05	0.62	0.00	0.00	0.65	0.04	0.57
Avail Cap(c_a), veh/h	283	2057	947	303	1920	884	147	0	0	176	184	157
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	15.3	8.3	12.6	18.7	9.9	44.6	0.0	0.0	43.3	40.7	42.9
Incr Delay (d2), s/veh	3.3	3.0	0.1	0.1	5.4	0.1	7.9	0.0	0.0	8.5	0.1	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	17.4	0.3	0.2	20.8	0.6	2.8	0.0	0.0	3.5	0.2	2.6
LnGrp Delay(d),s/veh	24.0	18.3	8.4	12.8	24.1	10.0	52.5	0.0	0.0	51.8	40.7	47.7
LnGrp LOS	C	B	A	B	C	B	D			D	D	D
Approach Vol, veh/h		1800			1721			92			211	
Approach Delay, s/veh		18.7			23.6			52.5			49.7	
Approach LOS		B			C			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	13.3	60.1		12.6	9.9	63.5		14.0				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (Gmax), s	5.5	52.1		* 5.4	5.0	52.6		6.4				
Max Q Clear Time (g_c+l1), s	5.4	43.2		7.2	2.4	37.1		8.3				
Green Ext Time (p_c), s	0.0	6.6		0.0	0.0	9.7		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				23.4								
HCM 2010 LOS				C								
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3848	3808	3928	3887	3886	3859	3886
Vehs Exited	3915	3810	3954	3881	3918	3854	3888
Starting Vehs	187	159	172	145	188	155	160
Ending Vehs	120	157	146	151	156	160	158
Travel Distance (mi)	4460	4346	4518	4435	4471	4423	4490
Travel Time (hr)	175.5	159.8	175.3	176.9	167.5	172.6	163.7
Total Delay (hr)	72.1	58.6	70.5	73.9	63.7	70.1	59.5
Total Stops	4081	3391	4077	4368	3761	4051	3445
Fuel Used (gal)	155.2	148.6	157.2	154.4	153.9	154.0	152.2

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3904	3870	3879	3876
Vehs Exited	3871	3921	3870	3889
Starting Vehs	140	184	144	162
Ending Vehs	173	133	153	150
Travel Distance (mi)	4490	4466	4468	4457
Travel Time (hr)	173.4	171.2	163.2	169.9
Total Delay (hr)	69.4	67.8	59.9	66.5
Total Stops	4041	3799	3374	3838
Fuel Used (gal)	155.5	154.7	151.7	153.7

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1053	1036	1088	1053	990	1072	1045
Vehs Exited	1018	1008	1028	970	1018	1007	1027
Starting Vehs	187	159	172	145	188	155	160
Ending Vehs	222	187	232	228	160	220	178
Travel Distance (mi)	1204	1181	1213	1163	1180	1204	1223
Travel Time (hr)	54.1	45.8	50.4	47.7	45.2	51.4	45.1
Total Delay (hr)	26.3	18.2	22.2	20.5	17.7	23.3	17.0
Total Stops	1446	967	1255	1152	1007	1338	947
Fuel Used (gal)	43.8	40.6	42.6	40.4	40.9	42.9	41.4

Interval #1 Information Int 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1079	1072	1035	1051
Vehs Exited	1014	1037	991	1012
Starting Vehs	140	184	144	162
Ending Vehs	205	219	188	203
Travel Distance (mi)	1203	1224	1196	1199
Travel Time (hr)	47.0	51.8	45.7	48.4
Total Delay (hr)	19.2	23.4	18.1	20.6
Total Stops	1092	1236	937	1135
Fuel Used (gal)	41.7	43.5	41.1	41.9

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	958	923	928	919	948	911	939
Vehs Exited	1049	975	1026	1001	979	998	970
Starting Vehs	222	187	232	228	160	220	178
Ending Vehs	131	135	134	146	129	133	147
Travel Distance (mi)	1164	1078	1135	1109	1103	1088	1100
Travel Time (hr)	47.9	39.0	46.6	47.1	39.8	46.3	40.1
Total Delay (hr)	20.9	13.9	20.4	21.3	14.3	21.1	14.5
Total Stops	1137	780	1166	1282	821	1159	824
Fuel Used (gal)	41.4	37.0	40.3	39.3	37.4	39.2	37.5

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	951	946	929	936
Vehs Exited	996	1023	966	998
Starting Vehs	205	219	188	203
Ending Vehs	160	142	151	140
Travel Distance (mi)	1136	1139	1061	1111
Travel Time (hr)	47.7	46.4	37.6	43.9
Total Delay (hr)	21.6	20.1	13.0	18.1
Total Stops	1199	1102	770	1023
Fuel Used (gal)	40.9	40.7	35.7	38.9

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	934	924	943	979	952	942	942
Vehs Exited	933	924	933	951	925	907	964
Starting Vehs	131	135	134	146	129	133	147
Ending Vehs	132	135	144	174	156	168	125
Travel Distance (mi)	1058	1062	1068	1084	1059	1052	1090
Travel Time (hr)	37.7	37.4	37.9	42.4	37.3	37.2	39.7
Total Delay (hr)	13.0	12.7	13.0	17.1	12.8	12.9	14.2
Total Stops	777	802	778	1027	789	772	807
Fuel Used (gal)	36.0	35.8	36.1	37.6	36.0	35.7	36.9

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	929	928	944	939
Vehs Exited	958	925	917	933
Starting Vehs	160	142	151	140
Ending Vehs	131	145	178	148
Travel Distance (mi)	1091	1054	1080	1070
Travel Time (hr)	39.3	36.3	38.2	38.3
Total Delay (hr)	13.8	12.0	13.3	13.5
Total Stops	840	713	772	807
Fuel Used (gal)	36.7	35.2	36.3	36.2

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	903	925	969	936	996	934	960
Vehs Exited	915	903	967	959	996	942	927
Starting Vehs	132	135	144	174	156	168	125
Ending Vehs	120	157	146	151	156	160	158
Travel Distance (mi)	1033	1026	1101	1079	1129	1078	1076
Travel Time (hr)	35.8	37.6	40.5	39.8	45.2	37.7	38.8
Total Delay (hr)	11.9	13.7	14.9	15.0	18.9	12.7	13.8
Total Stops	721	842	878	907	1144	782	867
Fuel Used (gal)	34.0	35.1	38.1	37.2	39.6	36.2	36.4

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	945	924	971	947
Vehs Exited	903	936	996	946
Starting Vehs	131	145	178	148
Ending Vehs	173	133	153	150
Travel Distance (mi)	1059	1049	1131	1076
Travel Time (hr)	39.4	36.7	41.6	39.3
Total Delay (hr)	14.8	12.3	15.5	14.4
Total Stops	910	748	895	868
Fuel Used (gal)	36.2	35.3	38.7	36.7

Queuing and Blocking Report
2025 No Build

2025 No Build AM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	646	642	283	520	536	201	183
Average Queue (ft)	377	371	45	224	254	121	96
95th Queue (ft)	643	634	168	448	467	184	167
Link Distance (ft)	1890	1890		935	935	874	874
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	39			4			
Queuing Penalty (veh)	0			2			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	WB	SB
Directions Served	L	T	LR
Maximum Queue (ft)	11	5	40
Average Queue (ft)	1	0	8
95th Queue (ft)	7	5	30
Link Distance (ft)		1625	695
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	158	229	240	66	100	436	432	255	145	140	79	123
Average Queue (ft)	75	95	102	6	13	228	224	14	64	75	10	43
95th Queue (ft)	134	195	200	36	56	388	390	109	125	132	64	92
Link Distance (ft)		1625	1625			2215	2215		526		674	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	170				50	105		260		125		140
Storage Blk Time (%)	0	1	18	0		24	5	0		4		0
Queuing Penalty (veh)	1	2	4	0		4	2	0		3		0

Network Summary

Network wide Queuing Penalty: 19

Lanes, Volumes, Timings
2025 No Build

2025 No Build PM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1992	130	116	1452	0	209	0	71	0	0	0
Future Volume (vph)	0	1992	130	116	1452	0	209	0	71	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		1927			1096			921			413	
Travel Time (s)		29.2			16.6			25.1			11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							31%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	11.9	108.6		21.0	117.7		21.6	21.6		8.8	8.8	
Total Split (%)	7.4%	67.9%		13.1%	73.6%		13.5%	13.5%		5.5%	5.5%	
Maximum Green (s)	2.0	101.8		11.1	110.9		13.6	13.6		2.6	2.6	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		Min	C-Min		Min	Min		None	None	
Act Effect Green (s)	114.9		11.1	135.9		16.0	13.6					
Actuated g/C Ratio	0.72		0.07	0.85		0.10	0.08					
v/c Ratio	0.91		1.03	0.53		0.93	0.46					
Control Delay	25.2		140.7	3.8		123.8	6.3					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	25.2		140.7	3.8		123.8	6.3					
LOS	C		F	A		F	A					
Approach Delay	25.2			13.9			67.0					
Approach LOS	C			B			E					

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 130 (81%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 23.7

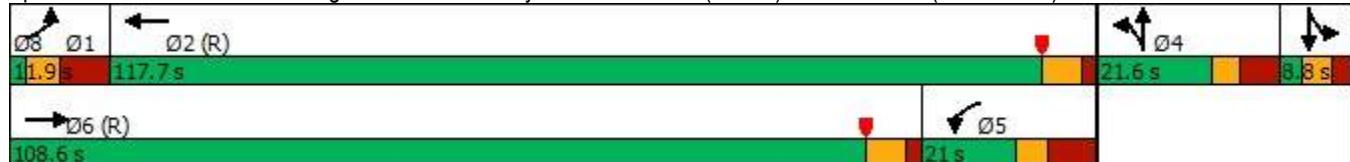
Intersection LOS: C

Intersection Capacity Utilization 91.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑				
Traffic Volume (veh/h)	0	1992	130	116	1452	0	209	0	71	0	0	0
Future Volume (veh/h)	0	1992	130	116	1452	0	209	0	71	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	2165	130	126	1578	0	152	105	77	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1	2258	134	222	2923	0	177	85	62	0	1	0
Arrive On Green	0.00	0.66	0.64	0.13	0.83	0.00	0.10	0.09	0.10	0.00	0.00	0.00
Sat Flow, veh/h	1783	3412	203	1765	3614	0	1774	1000	733	0	1863	0
Grp Volume(v), veh/h	0	1118	1177	126	1578	0	152	0	182	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1836	1765	1761	0	1774	0	1733	0	1863	0
Q Serve(g_s), s	0.0	91.6	96.6	10.8	22.1	0.0	13.5	0.0	13.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	91.6	96.6	10.8	22.1	0.0	13.5	0.0	13.6	0.0	0.0	0.0
Prop In Lane	1.00			0.11	1.00		0.00	1.00	0.42	0.00		0.00
Lane Grp Cap(c), veh/h	1	1177	1215	222	2923	0	177	0	147	0	1	0
V/C Ratio(X)	0.00	0.95	0.97	0.57	0.54	0.00	0.86	0.00	1.24	0.00	0.00	0.00
Avail Cap(c_a), veh/h	22	1179	1218	222	2923	0	177	0	147	0	30	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	24.6	25.7	65.9	4.2	0.0	70.9	0.0	72.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	16.6	19.2	3.4	0.7	0.0	31.6	0.0	150.9	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	50.2	54.9	5.5	10.8	0.0	8.2	0.0	12.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	41.3	44.9	69.3	4.9	0.0	102.5	0.0	223.6	0.0	0.0	0.0
LnGrp LOS	D	D	E	A		F		F				
Approach Vol, veh/h		2295			1704			334			0	
Approach Delay, s/veh		43.2			9.7			168.5			0.0	
Approach LOS	D			A			F					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	138.4		21.6	30.0	108.4		0.0				
Change Period (Y+Rc), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 2	* 1.1E2		* 14	11.1	* 1E2		2.6				
Max Q Clear Time (g_c+l1), s	0.0	24.1		15.6	12.8	98.6		0.0				
Green Ext Time (p_c), s	0.0	18.6		0.0	0.0	3.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			39.6									
HCM 2010 LOS			D									
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	2057	1577	2	1	1
Future Volume (vph)	2	2057	1577	2	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 66.9%

ICU Level of Service C

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	2	2057	1577	2	1	1
Future Vol, veh/h	2	2057	1577	2	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	2236	1714	2	1	1

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	1716	0	-	0	2837	858
Stage 1	-	-	-	-	1715	-
Stage 2	-	-	-	-	1122	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	365	-	-	-	14	300
Stage 1	-	-	-	-	131	-
Stage 2	-	-	-	-	273	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	365	-	-	-	14	300
Mov Cap-2 Maneuver	-	-	-	-	86	-
Stage 1	-	-	-	-	130	-
Stage 2	-	-	-	-	273	-

Approach	EB	WB	SB
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HCM Control Delay, s	0	0	32.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	365	-	-	-	134
HCM Lane V/C Ratio	0.006	-	-	-	0.016
HCM Control Delay (s)	14.9	-	-	-	32.3
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0

Lanes, Volumes, Timings
2025 No Build

2025 No Build PM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2	1	1	2	1	1	2	1	1	2	1
Traffic Volume (vph)	53	1939	27	6	1386	23	65	10	22	68	6	39
Future Volume (vph)	53	1939	27	6	1386	23	65	10	22	68	6	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			1%			2%	
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	12.9	111.0	111.0	12.9	111.0	111.0	20.7	20.7		15.4	15.4	15.4
Total Split (%)	8.1%	69.4%	69.4%	8.1%	69.4%	69.4%	12.9%	12.9%		9.6%	9.6%	9.6%
Maximum Green (s)	5.0	103.1	103.1	5.0	103.1	103.1	13.5	13.5		7.8	7.8	7.8
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	119.9	118.1	118.1	117.5	110.4	110.4		15.6		11.7	11.7	11.7
Actuated g/C Ratio	0.75	0.74	0.74	0.73	0.69	0.69		0.10		0.07	0.07	0.07
v/c Ratio	0.26	0.86	0.03	0.05	0.67	0.02		0.63		0.61	0.05	0.18
Control Delay	4.7	8.3	0.0	5.8	16.8	0.0		80.9		91.9	70.3	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	4.7	8.3	0.0	5.8	16.8	0.0		80.9		91.9	70.3	1.7
LOS	A	A	A	A	B	A		F		F	E	A
Approach Delay		8.1			16.5			80.9			59.7	
Approach LOS		A			B			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 14.9

Intersection LOS: B

Intersection Capacity Utilization 72.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	53	1939	27	6	1386	23	65	10	22	68	6	39
Future Volume (veh/h)	53	1939	27	6	1386	23	65	10	22	68	6	39
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	60	2203	31	7	1575	26	74	11	25	77	7	44
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	270	2426	1117	133	2331	1073	109	16	37	125	131	112
Arrive On Green	0.05	0.70	0.70	0.03	0.68	0.68	0.09	0.09	0.07	0.07	0.07	0.07
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1161	173	392	1756	1844	1568
Grp Volume(v), veh/h	60	2203	31	7	1575	26	110	0	0	77	7	44
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1726	0	0	1756	1844	1568
Q Serve(g_s), s	1.4	83.9	0.9	0.2	43.5	0.9	9.9	0.0	0.0	6.8	0.6	4.3
Cycle Q Clear(g_c), s	1.4	83.9	0.9	0.2	43.5	0.9	9.9	0.0	0.0	6.8	0.6	4.3
Prop In Lane	1.00		1.00	1.00		1.00	0.67		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	270	2426	1117	133	2331	1073	162	0	0	125	131	112
V/C Ratio(X)	0.22	0.91	0.03	0.05	0.68	0.02	0.68	0.00	0.00	0.62	0.05	0.39
Avail Cap(c_a), veh/h	274	2426	1117	173	2331	1073	180	0	0	125	131	112
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.2	19.6	7.2	27.7	15.1	8.3	70.5	0.0	0.0	72.2	69.3	71.0
Incr Delay (d2), s/veh	0.4	6.4	0.0	0.2	1.6	0.0	8.6	0.0	0.0	8.7	0.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	41.6	0.4	0.2	20.9	0.4	5.1	0.0	0.0	3.6	0.3	1.9
LnGrp Delay(d),s/veh	13.6	26.0	7.3	27.9	16.6	8.3	79.1	0.0	0.0	80.9	69.4	73.2
LnGrp LOS	B	C	A	C	B	A	E			F	E	E
Approach Vol, veh/h	2294				1608			110			128	
Approach Delay, s/veh	25.4				16.6			79.1			77.6	
Approach LOS	C				B			E			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	12.6	113.0		19.0	9.2	116.3		15.4				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (Gmax), s	5.0	103.1		* 14	5.0	103.1		7.8				
Max Q Clear Time (g_c+l1), s	3.4	45.5		11.9	2.2	85.9		8.8				
Green Ext Time (p_c), s	0.0	17.8		0.0	0.0	14.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				25.0								
HCM 2010 LOS				C								
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4273	4180	4290	4231	4191	4242	4195
Vehs Exited	4288	4168	4300	4203	4214	4248	4235
Starting Vehs	186	168	182	169	176	176	181
Ending Vehs	171	180	172	197	153	170	141
Travel Distance (mi)	4952	4840	5007	4893	4893	4941	4890
Travel Time (hr)	180.8	175.3	184.3	176.6	180.4	178.7	180.6
Total Delay (hr)	66.5	63.4	68.6	64.1	67.6	64.8	67.7
Total Stops	2933	2899	3123	2838	2950	3008	2935
Fuel Used (gal)	164.3	159.6	166.1	162.1	163.3	163.1	163.2

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4241	4284	4346	4246
Vehs Exited	4226	4242	4336	4247
Starting Vehs	176	165	185	177
Ending Vehs	191	207	195	175
Travel Distance (mi)	4932	4931	5061	4934
Travel Time (hr)	184.4	182.3	191.0	181.4
Total Delay (hr)	70.7	68.3	74.3	67.6
Total Stops	3148	2986	3156	2997
Fuel Used (gal)	165.0	165.2	169.4	164.1

Interval #0 Information Seeding

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1145	1161	1201	1177	1134	1109	1117
Vehs Exited	1116	1106	1141	1093	1086	1096	1066
Starting Vehs	186	168	182	169	176	176	181
Ending Vehs	215	223	242	253	224	189	232
Travel Distance (mi)	1306	1311	1354	1305	1303	1287	1267
Travel Time (hr)	48.6	48.6	55.1	48.5	50.8	47.3	48.0
Total Delay (hr)	18.4	18.2	23.8	18.3	20.7	17.6	18.8
Total Stops	781	828	1030	847	884	824	862
Fuel Used (gal)	43.4	43.8	46.9	43.5	44.4	43.0	42.6

Interval #1 Information Int 1

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1158	1119	1183	1151
Vehs Exited	1092	1107	1112	1100
Starting Vehs	176	165	185	177
Ending Vehs	242	177	256	224
Travel Distance (mi)	1301	1306	1328	1307
Travel Time (hr)	52.1	47.3	52.4	49.9
Total Delay (hr)	22.1	17.2	21.7	19.7
Total Stops	951	777	961	876
Fuel Used (gal)	44.8	43.6	45.1	44.1

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1034	973	964	995	1005	1064	1037
Vehs Exited	1096	1065	1073	1079	1072	1060	1091
Starting Vehs	215	223	242	253	224	189	232
Ending Vehs	153	131	133	169	157	193	178
Travel Distance (mi)	1224	1208	1203	1232	1204	1240	1249
Travel Time (hr)	43.9	44.4	44.5	45.7	44.1	47.1	45.9
Total Delay (hr)	15.7	16.4	16.8	17.5	16.4	18.4	17.1
Total Stops	703	737	740	756	656	882	725
Fuel Used (gal)	40.9	40.0	40.0	41.3	39.8	41.5	42.0

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	995	1056	1061	1017
Vehs Exited	1100	1049	1154	1084
Starting Vehs	242	177	256	224
Ending Vehs	137	184	163	158
Travel Distance (mi)	1233	1209	1309	1231
Travel Time (hr)	46.3	42.8	51.6	45.6
Total Delay (hr)	17.8	14.7	21.4	17.2
Total Stops	795	672	833	748
Fuel Used (gal)	40.7	39.8	44.6	41.1

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1016	1030	1002	1040	1008	1043	1032
Vehs Exited	1026	996	966	1041	1005	1049	1041
Starting Vehs	153	131	133	169	157	193	178
Ending Vehs	143	165	169	168	160	187	169
Travel Distance (mi)	1191	1177	1162	1197	1169	1249	1198
Travel Time (hr)	40.1	40.5	38.7	41.6	41.3	44.0	44.5
Total Delay (hr)	12.7	13.5	11.9	14.2	14.4	15.2	16.9
Total Stops	580	603	590	596	645	652	685
Fuel Used (gal)	38.2	38.4	37.0	39.1	39.0	40.9	39.5

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1029	1023	1036	1026
Vehs Exited	1028	1034	1028	1022
Starting Vehs	137	184	163	158
Ending Vehs	138	173	171	164
Travel Distance (mi)	1196	1188	1210	1194
Travel Time (hr)	43.2	43.9	42.6	42.0
Total Delay (hr)	15.6	16.6	14.8	14.6
Total Stops	691	668	611	632
Fuel Used (gal)	39.7	39.9	39.7	39.1

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1078	1016	1123	1019	1044	1026	1009
Vehs Exited	1050	1001	1120	990	1051	1043	1037
Starting Vehs	143	165	169	168	160	187	169
Ending Vehs	171	180	172	197	153	170	141
Travel Distance (mi)	1230	1144	1288	1159	1217	1165	1177
Travel Time (hr)	48.1	41.8	46.0	40.9	44.1	40.3	42.1
Total Delay (hr)	19.8	15.2	16.1	14.1	16.1	13.6	14.9
Total Stops	869	731	763	639	765	650	663
Fuel Used (gal)	41.7	37.4	42.2	38.2	40.1	37.6	39.1

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1059	1086	1066	1052
Vehs Exited	1006	1052	1042	1039
Starting Vehs	138	173	171	164
Ending Vehs	191	207	195	175
Travel Distance (mi)	1202	1228	1214	1203
Travel Time (hr)	42.8	48.2	44.5	43.9
Total Delay (hr)	15.1	19.7	16.4	16.1
Total Stops	711	869	751	739
Fuel Used (gal)	39.7	41.8	40.1	39.8

Queuing and Blocking Report
2025 No Build

2025 No Build PM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	765	777	253	315	333	242	238
Average Queue (ft)	432	429	132	92	114	155	137
95th Queue (ft)	684	684	277	248	261	231	222
Link Distance (ft)	1890	1890		935	935	874	874
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	26		4	0			
Queuing Penalty (veh)	0		28	0			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (ft)	21	20
Average Queue (ft)	2	1
95th Queue (ft)	13	11
Link Distance (ft)		695
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	184	555	553	69	46	368	358	33	215	138	95	106
Average Queue (ft)	37	230	237	6	4	175	167	1	99	75	11	28
95th Queue (ft)	110	450	456	37	24	327	320	29	181	135	64	68
Link Distance (ft)		1625	1625			2215	2215			526		674
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		170			50	105		260		125		140
Storage Blk Time (%)			13	21	0		15	2		4		0
Queuing Penalty (veh)			7	6	0		1	1		2		0

Network Summary

Network wide Queuing Penalty: 44



Appendix I: Build Conditions (2025) Capacity Analysis

Lanes, Volumes, Timings
2025 Build

2025 Build AM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1589	44	59	1668	0	268	0	77	0	0	0
Future Volume (vph)	0	1589	44	59	1668	0	268	0	77	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		1927			1096			921			413	
Travel Time (s)		29.2			16.6			25.1			11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							34%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	11.9	57.0		11.9	57.0		22.3	22.3		8.8	8.8	
Total Split (%)	11.9%	57.0%		11.9%	57.0%		22.3%	22.3%		8.8%	8.8%	
Maximum Green (s)	2.0	50.2		2.0	50.2		14.3	14.3		2.6	2.6	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	C-Min		Min	C-Min		Min	Min		Min	Min	
Act Effct Green (s)	54.6		2.0	54.5		16.0	13.6					
Actuated g/C Ratio	0.55		0.02	0.54		0.16	0.14					
v/c Ratio	0.92		1.83	0.94		0.72	0.37					
Control Delay	29.7		461.8	32.7		55.6	2.1					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	29.7		461.8	32.7		55.6	2.1					
LOS	C		F	C		E	A					
Approach Delay	29.7			47.4			29.5					
Approach LOS	C			D			C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 51 (51%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.83

Intersection Signal Delay: 37.9

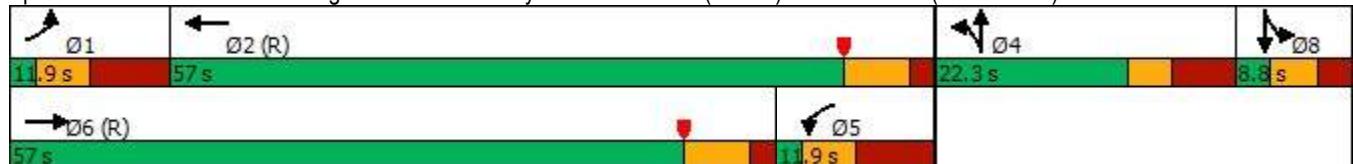
Intersection LOS: D

Intersection Capacity Utilization 68.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑				
Traffic Volume (veh/h)	0	1589	44	59	1668	0	268	0	77	0	0	0
Future Volume (veh/h)	0	1589	44	59	1668	0	268	0	77	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1727	48	64	1813	0	188	145	84	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	2	1903	53	202	2539	0	296	158	92	0	2	0
Arrive On Green	0.00	0.54	0.50	0.11	0.72	0.00	0.17	0.14	0.17	0.00	0.00	0.00
Sat Flow, veh/h	1783	3535	98	1765	3614	0	1774	1108	642	0	1863	0
Grp Volume(v), veh/h	0	866	909	64	1813	0	188	0	229	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1855	1765	1761	0	1774	0	1749	0	1863	0
Q Serve(g_s), s	0.0	43.8	44.4	3.3	29.6	0.0	9.9	0.0	12.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	43.8	44.4	3.3	29.6	0.0	9.9	0.0	12.9	0.0	0.0	0.0
Prop In Lane	1.00			1.00		0.00	1.00		0.37	0.00		0.00
Lane Grp Cap(c), veh/h	2	958	999	202	2539	0	296	0	250	0	2	0
V/C Ratio(X)	0.00	0.90	0.91	0.32	0.71	0.00	0.63	0.00	0.92	0.00	0.00	0.00
Avail Cap(c_a), veh/h	36	969	1011	202	2539	0	296	0	250	0	48	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	20.8	21.0	40.7	8.0	0.0	38.8	0.0	41.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	13.5	13.7	0.9	1.7	0.0	4.4	0.0	35.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	25.0	26.3	1.7	14.7	0.0	5.2	0.0	8.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	34.3	34.7	41.6	9.8	0.0	43.2	0.0	76.9	0.0	0.0	0.0
LnGrp LOS	C	C	D	A		D		E				
Approach Vol, veh/h		1775			1877			417			0	
Approach Delay, s/veh		34.5			10.9			61.7			0.0	
Approach LOS		C			B			E				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	0.0	77.7		22.3	21.4	56.3		0.0				
Change Period (Y+R _c), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 2	* 50		* 14	2.0	* 50		2.6				
Max Q Clear Time (g_c+l1), s	0.0	31.6		14.9	5.3	46.4		0.0				
Green Ext Time (p_c), s	0.0	12.5		0.0	0.0	3.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			26.4									
HCM 2010 LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	23	1648	1663	12	38	70
Future Volume (vph)	23	1648	1663	12	38	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25			25		
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 57.4%

ICU Level of Service B

Analysis Period (min) 15

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	23	1648	1663	12	38	70
Future Vol, veh/h	23	1648	1663	12	38	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1791	1808	13	41	76

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	1821	0	-	0	2761	911
Stage 1	-	-	-	-	1815	-
Stage 2	-	-	-	-	946	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	332	-	-	-	~ 16	277
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	338	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	332	-	-	-	~ 15	277
Mov Cap-2 Maneuver	-	-	-	-	77	-
Stage 1	-	-	-	-	106	-
Stage 2	-	-	-	-	338	-

Approach	EB	WB	SB
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HCM Control Delay, s	0.2	0	48.7
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HCM LOS	E
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Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
-----------------------	-----	-----	-----	-----	-------	-------

Capacity (veh/h)	332	-	-	-	77	277
HCM Lane V/C Ratio	0.075	-	-	-	0.536	0.275
HCM Control Delay (s)	16.7	-	-	-	96.3	22.8
HCM Lane LOS	C	-	-	-	F	C
HCM 95th %tile Q(veh)	0.2	-	-	-	2.3	1.1

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
2025 Build

2025 Build AM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	2	1	1	2	1	1	2	1	1	2	1
Traffic Volume (vph)	147	1448	24	16	1468	41	54	5	22	101	6	78
Future Volume (vph)	147	1448	24	16	1468	41	54	5	22	101	6	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			1%			2%	
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	13.4	60.5	60.5	12.9	60.0	60.0	12.6	12.6		14.0	14.0	14.0
Total Split (%)	13.4%	60.5%	60.5%	12.9%	60.0%	60.0%	12.6%	12.6%		14.0%	14.0%	14.0%
Maximum Green (s)	5.5	52.6	52.6	5.0	52.1	52.1	5.4	5.4		6.4	6.4	6.4
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	70.3	66.5	66.5	67.0	58.0	58.0	8.7		10.3	10.3	10.3	
Actuated g/C Ratio	0.70	0.66	0.66	0.67	0.58	0.58	0.09		0.10	0.10	0.10	
v/c Ratio	0.68	0.72	0.02	0.08	0.84	0.05	0.56		0.64	0.04	0.25	
Control Delay	46.1	3.7	0.0	5.6	23.0	0.1	50.7		60.7	41.3	1.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	46.1	3.7	0.0	5.6	23.0	0.1	50.7		60.7	41.3	1.7	
LOS	D	A	A	A	C	A	D		E	D	A	
Approach Delay		7.5			22.2		50.7			35.1		
Approach LOS		A			C		D			D		
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 16.6

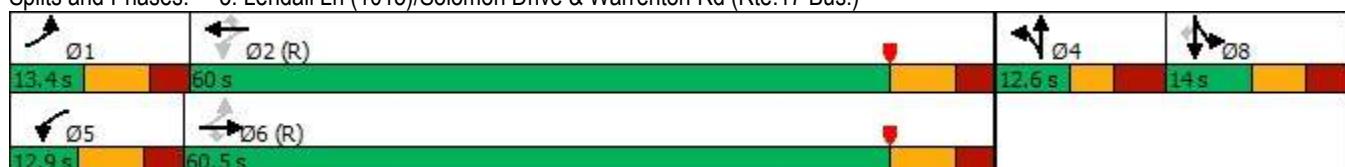
Intersection LOS: B

Intersection Capacity Utilization 70.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	1448	24	16	1468	41	54	5	22	101	6	78
Future Volume (veh/h)	147	1448	24	16	1468	41	54	5	22	101	6	78
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	167	1645	27	18	1668	47	61	6	25	115	7	89
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	278	2057	947	242	1920	884	98	10	40	176	184	157
Arrive On Green	0.09	0.60	0.60	0.06	0.56	0.56	0.09	0.09	0.05	0.10	0.10	0.10
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1137	112	466	1756	1844	1568
Grp Volume(v), veh/h	167	1645	27	18	1668	47	92	0	0	115	7	89
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1714	0	0	1756	1844	1568
Q Serve(g_s), s	3.4	36.8	0.7	0.4	41.8	1.3	5.2	0.0	0.0	6.3	0.3	5.4
Cycle Q Clear(g_c), s	3.4	36.8	0.7	0.4	41.8	1.3	5.2	0.0	0.0	6.3	0.3	5.4
Prop In Lane	1.00			1.00		1.00	0.66		0.27	1.00		1.00
Lane Grp Cap(c), veh/h	278	2057	947	242	1920	884	147	0	0	176	184	157
V/C Ratio(X)	0.60	0.80	0.03	0.07	0.87	0.05	0.62	0.00	0.00	0.65	0.04	0.57
Avail Cap(c_a), veh/h	280	2057	947	296	1920	884	147	0	0	176	184	157
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	15.6	8.3	13.2	18.8	9.9	44.6	0.0	0.0	43.3	40.7	42.9
Incr Delay (d2), s/veh	3.5	3.4	0.1	0.1	5.7	0.1	7.9	0.0	0.0	8.5	0.1	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	18.3	0.3	0.2	21.0	0.6	2.8	0.0	0.0	3.5	0.2	2.6
LnGrp Delay(d),s/veh	24.3	19.0	8.4	13.4	24.5	10.0	52.5	0.0	0.0	51.8	40.7	47.7
LnGrp LOS	C	B	A	B	C	B	D			D	D	D
Approach Vol, veh/h		1839			1733			92			211	
Approach Delay, s/veh		19.3			23.9			52.5			49.7	
Approach LOS		B			C			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	13.3	60.1		12.6	9.9	63.5		14.0				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (Gmax), s	5.5	52.1		* 5.4	5.0	52.6		6.4				
Max Q Clear Time (g_c+l1), s	5.4	43.8		7.2	2.4	38.8		8.3				
Green Ext Time (p_c), s	0.0	6.3		0.0	0.0	9.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				23.8								
HCM 2010 LOS				C								
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4103	3994	4123	4001	3992	3985	4089
Vehs Exited	4093	3973	4097	3964	3990	3980	4075
Starting Vehs	176	140	169	165	186	183	165
Ending Vehs	186	161	195	202	188	188	179
Travel Distance (mi)	4637	4480	4670	4504	4519	4505	4583
Travel Time (hr)	222.3	183.7	211.8	193.2	198.7	190.7	193.6
Total Delay (hr)	114.0	79.3	103.4	88.3	93.5	85.6	86.7
Total Stops	5039	4162	4496	3652	4385	3831	4000
Fuel Used (gal)	171.3	158.6	170.9	161.6	163.6	161.7	163.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3961	3987	4055	4028
Vehs Exited	3956	4007	4030	4017
Starting Vehs	145	180	172	167
Ending Vehs	150	160	197	177
Travel Distance (mi)	4508	4543	4576	4553
Travel Time (hr)	184.7	191.0	211.5	198.1
Total Delay (hr)	79.8	85.2	104.8	92.1
Total Stops	4278	4271	4749	4287
Fuel Used (gal)	158.8	161.8	167.2	163.9

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1105	1066	1116	1089	1117	1017	1080
Vehs Exited	1027	1009	1046	1020	1054	1014	1030
Starting Vehs	176	140	169	165	186	183	165
Ending Vehs	254	197	239	234	249	186	215
Travel Distance (mi)	1194	1169	1231	1197	1253	1168	1195
Travel Time (hr)	56.1	46.7	55.6	50.0	54.9	47.3	47.7
Total Delay (hr)	28.1	19.4	27.2	22.0	25.9	20.1	20.0
Total Stops	1418	1059	1273	1063	1298	1000	1018
Fuel Used (gal)	43.4	40.7	45.0	42.5	45.3	41.2	41.7

Interval #1 Information Int 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1134	1110	1112	1093
Vehs Exited	1022	1026	1044	1030
Starting Vehs	145	180	172	167
Ending Vehs	257	264	240	232
Travel Distance (mi)	1218	1224	1223	1207
Travel Time (hr)	52.8	53.2	54.6	51.9
Total Delay (hr)	24.2	24.7	26.1	23.8
Total Stops	1378	1342	1359	1221
Fuel Used (gal)	43.3	44.0	44.2	43.1

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1017	960	996	926	919	1002	975
Vehs Exited	1057	995	1022	994	1004	1020	1021
Starting Vehs	254	197	239	234	249	186	215
Ending Vehs	214	162	213	166	164	168	169
Travel Distance (mi)	1187	1121	1152	1088	1104	1136	1118
Travel Time (hr)	62.2	45.5	52.5	46.4	51.9	50.7	47.6
Total Delay (hr)	34.5	19.2	25.7	20.9	26.3	24.2	21.6
Total Stops	1641	967	1147	801	1241	1070	965
Fuel Used (gal)	45.3	39.6	42.4	39.1	40.8	41.5	40.2

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	921	948	1004	967
Vehs Exited	1030	1037	1028	1021
Starting Vehs	257	264	240	232
Ending Vehs	148	175	216	179
Travel Distance (mi)	1127	1141	1162	1134
Travel Time (hr)	50.6	52.3	58.7	51.8
Total Delay (hr)	24.4	25.8	31.8	25.4
Total Stops	1312	1303	1555	1201
Fuel Used (gal)	41.2	42.2	43.8	41.6

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	995	975	993	1004	972	981	1021
Vehs Exited	1013	949	1014	982	955	972	1002
Starting Vehs	214	162	213	166	164	168	169
Ending Vehs	196	188	192	188	181	177	188
Travel Distance (mi)	1128	1055	1127	1121	1074	1100	1136
Travel Time (hr)	52.4	41.8	50.6	47.6	45.5	46.5	47.3
Total Delay (hr)	26.1	17.3	24.2	21.7	20.4	20.9	20.7
Total Stops	1091	925	1023	881	965	890	935
Fuel Used (gal)	41.3	36.7	41.0	39.8	38.3	39.6	40.5

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	958	969	967	983
Vehs Exited	941	976	980	980
Starting Vehs	148	175	216	179
Ending Vehs	165	168	203	184
Travel Distance (mi)	1078	1106	1096	1102
Travel Time (hr)	40.1	43.7	49.4	46.5
Total Delay (hr)	15.1	18.1	23.8	20.8
Total Stops	749	826	975	925
Fuel Used (gal)	36.8	38.6	39.7	39.2

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	986	993	1018	982	984	985	1013
Vehs Exited	996	1020	1015	968	977	974	1022
Starting Vehs	196	188	192	188	181	177	188
Ending Vehs	186	161	195	202	188	188	179
Travel Distance (mi)	1129	1135	1160	1098	1089	1101	1133
Travel Time (hr)	51.5	49.7	53.1	49.2	46.4	46.2	50.8
Total Delay (hr)	25.3	23.3	26.3	23.7	20.9	20.5	24.4
Total Stops	889	1211	1053	907	881	871	1082
Fuel Used (gal)	41.3	41.5	42.4	40.1	39.2	39.4	41.0

Interval #4 Information Int 4

Start Time 8:15

End Time 8:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	948	960	972	983
Vehs Exited	963	968	978	986
Starting Vehs	165	168	203	184
Ending Vehs	150	160	197	177
Travel Distance (mi)	1085	1072	1094	1110
Travel Time (hr)	41.2	41.8	48.6	47.9
Total Delay (hr)	16.1	16.7	23.1	22.0
Total Stops	839	800	860	941
Fuel Used (gal)	37.4	37.0	39.6	39.9

Queuing and Blocking Report
2025 Build

2025 Build AM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	658	641	263	644	649	196	182
Average Queue (ft)	397	389	53	285	310	120	94
95th Queue (ft)	673	661	194	560	570	180	165
Link Distance (ft)	1890	1890		922	922	874	874
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	41		0	8			
Queuing Penalty (veh)	0		0	5			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	52	92	11	570	342
Average Queue (ft)	13	3	0	404	78
95th Queue (ft)	39	94	7	704	317
Link Distance (ft)		922	1625	695	695
Upstream Blk Time (%)		0		9	3
Queuing Penalty (veh)		0		0	0
Storage Bay Dist (ft)		100			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	159	228	214	63	109	421	417	159	166	140	136	106
Average Queue (ft)	74	99	103	6	13	220	218	11	75	81	19	39
95th Queue (ft)	135	194	189	38	56	366	370	94	146	137	110	84
Link Distance (ft)		1625	1625			2215	2215			526		674
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	170				50	105		260		125		140
Storage Blk Time (%)	0	1	20	0		24	5	0		6		
Queuing Penalty (veh)	1	1	5	0		4	2	0		5		

Network Summary

Network wide Queuing Penalty: 23

Lanes, Volumes, Timings
2025 Build

2025 Build PM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2061	130	116	1496	0	209	0	71	0	0	0
Future Volume (vph)	0	2061	130	116	1496	0	209	0	71	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			0%			0%	
Storage Length (ft)	100		0	300		0	0		150	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red		Yes			Yes			Yes			No	
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		1927			1096			921			413	
Travel Time (s)		29.2			16.6			25.1			11.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)							31%					
Turn Type	Prot	NA		Prot	NA		Split	NA				
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases												
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Minimum Split (s)	11.9	12.3		11.9	8.8		10.0	10.0		8.8	8.8	
Total Split (s)	11.9	108.6		21.0	117.7		21.6	21.6		8.8	8.8	
Total Split (%)	7.4%	67.9%		13.1%	73.6%		13.5%	13.5%		5.5%	5.5%	
Maximum Green (s)	2.0	101.8		11.1	110.9		13.6	13.6		2.6	2.6	
Yellow Time (s)	3.9	4.8		3.9	4.8		3.3	3.3		3.5	3.5	
All-Red Time (s)	6.0	2.0		6.0	2.0		4.7	4.7		2.7	2.7	
Lost Time Adjust (s)	0.0	-4.3		0.0	-4.3		-2.4	0.0		0.0		
Total Lost Time (s)	9.9	2.5		9.9	2.5		5.6	8.0		6.2		
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		Min	C-Min		Min	Min		None	None	
Act Effect Green (s)	114.9		11.1	135.9		16.0	13.6					
Actuated g/C Ratio	0.72		0.07	0.85		0.10	0.08					
v/c Ratio	0.94		1.03	0.54		0.93	0.46					
Control Delay	28.5		141.4	4.1		123.8	6.3					
Queue Delay	0.0		0.0	0.0		0.0	0.0					
Total Delay	28.5		141.4	4.1		123.8	6.3					
LOS	C		F	A		F	A					
Approach Delay	28.5			14.0			67.0					
Approach LOS	C			B			E					

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 130 (81%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 25.4

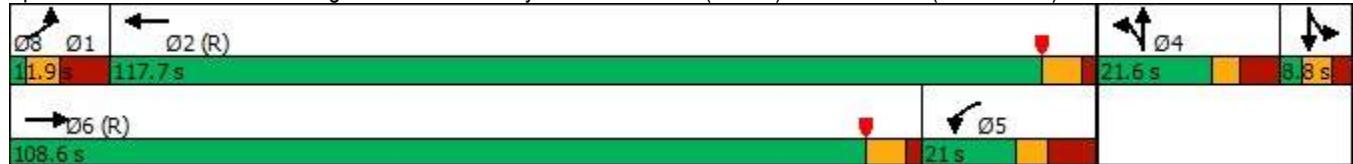
Intersection LOS: C

Intersection Capacity Utilization 93.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑		↑	↑↑		↑	↑				
Traffic Volume (veh/h)	0	2061	130	116	1496	0	209	0	71	0	0	0
Future Volume (veh/h)	0	2061	130	116	1496	0	209	0	71	0	0	0
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1872	1910	1853	1853	1890	1863	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	2240	130	126	1626	0	152	105	77	0	0	0
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	1	2267	130	220	2923	0	177	85	62	0	1	0
Arrive On Green	0.00	0.66	0.64	0.12	0.83	0.00	0.10	0.09	0.10	0.00	0.00	0.00
Sat Flow, veh/h	1783	3419	197	1765	3614	0	1774	1000	733	0	1863	0
Grp Volume(v), veh/h	0	1155	1215	126	1626	0	152	0	182	0	0	0
Grp Sat Flow(s),veh/h/ln	1783	1778	1837	1765	1761	0	1774	0	1733	0	1863	0
Q Serve(g_s), s	0.0	99.8	105.3	10.8	23.3	0.0	13.5	0.0	13.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	99.8	105.3	10.8	23.3	0.0	13.5	0.0	13.6	0.0	0.0	0.0
Prop In Lane	1.00			0.11	1.00		0.00	1.00	0.42	0.00		0.00
Lane Grp Cap(c), veh/h	1	1179	1218	220	2923	0	177	0	147	0	1	0
V/C Ratio(X)	0.00	0.98	1.00	0.57	0.56	0.00	0.86	0.00	1.24	0.00	0.00	0.00
Avail Cap(c_a), veh/h	22	1179	1218	220	2923	0	177	0	147	0	30	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	25.9	27.0	66.1	4.3	0.0	70.9	0.0	72.7	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	21.6	25.2	3.6	0.8	0.0	31.6	0.0	150.9	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	55.5	61.5	5.5	11.4	0.0	8.2	0.0	12.7	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	47.5	52.2	69.7	5.1	0.0	102.5	0.0	223.6	0.0	0.0	0.0
LnGrp LOS	D	D	E	A		F		F				
Approach Vol, veh/h		2370			1752			334			0	
Approach Delay, s/veh		49.9			9.7			168.5			0.0	
Approach LOS	D			A			F					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	138.4		21.6	29.8	108.6		0.0				
Change Period (Y+Rc), s	* 9.9	* 9.9		* 8	9.9	* 6.8		6.2				
Max Green Setting (Gmax), s	* 2	* 1.1E2		* 14	11.1	* 1E2		2.6				
Max Q Clear Time (g_c+l1), s	0.0	25.3		15.6	12.8	107.3		0.0				
Green Ext Time (p_c), s	0.0	19.8		0.0	0.0	0.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				43.0								
HCM 2010 LOS				D								
Notes												

User approved volume balancing among the lanes for turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	71	2057	1577	38	24	45
Future Volume (vph)	71	2057	1577	38	24	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		-1%	1%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Link Speed (mph)		45	45		25	
Link Distance (ft)	1096	1719		744		
Travel Time (s)		16.6	26.0		20.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free	Free		Stop		

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 66.9%

ICU Level of Service C

Analysis Period (min) 15

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	71	2057	1577	38	24	45
Future Vol, veh/h	71	2057	1577	38	24	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-1	1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	77	2236	1714	41	26	49

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	1755	0	-	0	3007	878
Stage 1	-	-	-	-	1735	-
Stage 2	-	-	-	-	1272	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	353	-	-	-	~ 10	291
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	227	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	353	-	-	-	~ 8	291
Mov Cap-2 Maneuver	-	-	-	-	58	-
Stage 1	-	-	-	-	99	-
Stage 2	-	-	-	-	227	-

Approach	EB	WB	SB
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HCM Control Delay, s	0.6	0	51.3
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HCM LOS	F
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Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
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Capacity (veh/h)	353	-	-	-	58	291
HCM Lane V/C Ratio	0.219	-	-	-	0.45	0.168
HCM Control Delay (s)	18	-	-	-	110.3	19.9
HCM Lane LOS	C	-	-	-	F	C
HCM 95th %tile Q(veh)	0.8	-	-	-	1.7	0.6

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
2025 Build

2025 Build PM
01/09/2020

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	1962	27	6	1422	23	65	10	22	68	6	39
Future Volume (vph)	53	1962	27	6	1422	23	65	10	22	68	6	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	-1%				1%			1%			2%	
Storage Length (ft)	170		50	105		260	0		100	125		140
Storage Lanes	1		1	1		1	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		1719			2268			586			730	
Travel Time (s)		26.0			34.4			13.3			14.2	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6			5	2		4	4		8	8
Permitted Phases	6		6	2			2					8
Detector Phase	1	6	6	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	12.0	12.0	5.0	12.0	12.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.9	19.9	19.9	12.9	32.9	32.9	12.2	12.2		12.6	12.6	12.6
Total Split (s)	12.9	111.0	111.0	12.9	111.0	111.0	20.7	20.7		15.4	15.4	15.4
Total Split (%)	8.1%	69.4%	69.4%	8.1%	69.4%	69.4%	12.9%	12.9%		9.6%	9.6%	9.6%
Maximum Green (s)	5.0	103.1	103.1	5.0	103.1	103.1	13.5	13.5		7.8	7.8	7.8
Yellow Time (s)	4.9	4.9	4.9	4.9	4.9	4.9	3.4	3.4		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.8		3.6	3.6	3.6
Lost Time Adjust (s)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.2	-3.2		-3.6	-3.6	-3.6
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	None
Walk Time (s)					7.0	7.0						
Flash Dont Walk (s)					18.0	18.0						
Pedestrian Calls (#/hr)					0	0						
Act Effct Green (s)	120.0	118.2	118.2	117.6	110.5	110.5		15.6		11.6	11.6	11.6
Actuated g/C Ratio	0.75	0.74	0.74	0.74	0.69	0.69		0.10		0.07	0.07	0.07
v/c Ratio	0.27	0.87	0.03	0.05	0.68	0.02		0.63		0.61	0.05	0.18
Control Delay	4.9	8.6	0.0	5.8	17.2	0.0		80.9		92.5	70.3	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	4.9	8.6	0.0	5.8	17.2	0.0		80.9		92.5	70.3	1.7
LOS	A	A	A	A	B	A		F		F	E	A
Approach Delay		8.4			16.9			80.9			60.1	
Approach LOS		A			B			F			E	
Intersection Summary												
Area Type:	Other											
Cycle Length: 160												

Actuated Cycle Length: 160

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow, Master Intersection

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 15.2

Intersection LOS: B

Intersection Capacity Utilization 73.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	53	1962	27	6	1422	23	65	10	22	68	6	39
Future Volume (veh/h)	53	1962	27	6	1422	23	65	10	22	68	6	39
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Q _b), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1872	1819	1872	1853	1800	1853	1890	1853	1890	1844	1844	1844
Adj Flow Rate, veh/h	60	2230	31	7	1616	26	74	11	25	77	7	44
Adj No. of Lanes	1	2	1	1	2	1	0	1	0	1	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	5	2	2	5	2	2	2	2	2	2	2
Cap, veh/h	261	2426	1117	129	2331	1073	109	16	37	125	131	112
Arrive On Green	0.05	0.70	0.70	0.03	0.68	0.68	0.09	0.09	0.07	0.07	0.07	0.07
Sat Flow, veh/h	1783	3455	1591	1765	3421	1575	1161	173	392	1756	1844	1568
Grp Volume(v), veh/h	60	2230	31	7	1616	26	110	0	0	77	7	44
Grp Sat Flow(s),veh/h/ln	1783	1728	1591	1765	1710	1575	1726	0	0	1756	1844	1568
Q Serve(g_s), s	1.4	86.8	0.9	0.2	45.7	0.9	9.9	0.0	0.0	6.8	0.6	4.3
Cycle Q Clear(g_c), s	1.4	86.8	0.9	0.2	45.7	0.9	9.9	0.0	0.0	6.8	0.6	4.3
Prop In Lane	1.00		1.00	1.00		1.00	0.67		0.23	1.00		1.00
Lane Grp Cap(c), veh/h	261	2426	1117	129	2331	1073	162	0	0	125	131	112
V/C Ratio(X)	0.23	0.92	0.03	0.05	0.69	0.02	0.68	0.00	0.00	0.62	0.05	0.39
Avail Cap(c_a), veh/h	265	2426	1117	170	2331	1073	180	0	0	125	131	112
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.0	20.0	7.2	29.3	15.4	8.3	70.5	0.0	0.0	72.2	69.3	71.0
Incr Delay (d2), s/veh	0.4	7.1	0.0	0.2	1.7	0.0	8.6	0.0	0.0	8.7	0.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	43.3	0.4	0.2	21.9	0.4	5.1	0.0	0.0	3.6	0.3	1.9
LnGrp Delay(d),s/veh	14.5	27.1	7.3	29.5	17.1	8.3	79.1	0.0	0.0	80.9	69.4	73.2
LnGrp LOS	B	C	A	C	B	A	E			F	E	E
Approach Vol, veh/h		2321			1649			110			128	
Approach Delay, s/veh		26.5			17.0			79.1			77.6	
Approach LOS		C			B			E			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+R _c), s	12.6	113.0		19.0	9.2	116.3		15.4				
Change Period (Y+R _c), s	7.9	7.9		* 7.2	7.9	7.9		7.6				
Max Green Setting (Gmax), s	5.0	103.1		* 14	5.0	103.1		7.8				
Max Q Clear Time (g_c+l1), s	3.4	47.7		11.9	2.2	88.8		8.8				
Green Ext Time (p_c), s	0.0	18.5		0.0	0.0	12.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				25.7								
HCM 2010 LOS				C								
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4418	4274	4447	4299	4286	4269	4338
Vehs Exited	4462	4312	4478	4346	4281	4281	4369
Starting Vehs	215	214	191	219	189	182	201
Ending Vehs	171	176	160	172	194	170	170
Travel Distance (mi)	5113	4948	5094	4957	4947	4907	5006
Travel Time (hr)	204.7	194.1	195.2	179.1	178.7	180.0	196.9
Total Delay (hr)	86.1	79.7	77.1	64.6	64.4	66.5	81.1
Total Stops	3664	3492	3272	3021	2930	2980	3473
Fuel Used (gal)	176.2	171.1	173.7	165.4	166.2	164.8	172.3

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4388	4395	4360	4347
Vehs Exited	4377	4422	4363	4368
Starting Vehs	176	213	156	192
Ending Vehs	187	186	153	172
Travel Distance (mi)	5079	5033	4961	5005
Travel Time (hr)	196.7	231.4	180.8	193.7
Total Delay (hr)	78.9	114.7	65.8	77.9
Total Stops	3381	4692	2949	3386
Fuel Used (gal)	172.7	183.0	166.7	171.2

Interval #0 Information Seeding

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time 4:45

End Time 5:00

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1223	1178	1192	1181	1141	1126	1133
Vehs Exited	1143	1130	1121	1176	1107	1103	1099
Starting Vehs	215	214	191	219	189	182	201
Ending Vehs	295	262	262	224	223	205	235
Travel Distance (mi)	1354	1313	1326	1344	1313	1282	1286
Travel Time (hr)	60.1	57.6	53.1	51.9	49.5	47.2	51.6
Total Delay (hr)	28.6	27.2	22.3	20.8	19.3	17.5	22.0
Total Stops	1230	1192	928	983	879	795	975
Fuel Used (gal)	48.3	46.9	45.8	46.2	45.1	43.0	44.5

Interval #1 Information Int 1

Start Time 4:45

End Time 5:00

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1219	1222	1216	1183
Vehs Exited	1149	1148	1127	1131
Starting Vehs	176	213	156	192
Ending Vehs	246	287	245	249
Travel Distance (mi)	1377	1350	1327	1327
Travel Time (hr)	55.6	63.2	51.1	54.1
Total Delay (hr)	23.6	32.0	20.2	23.4
Total Stops	1012	1476	876	1036
Fuel Used (gal)	47.3	49.2	45.1	46.2

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1068	1005	1089	967	1055	1086	1072
Vehs Exited	1201	1106	1150	1041	1108	1123	1130
Starting Vehs	295	262	262	224	223	205	235
Ending Vehs	162	161	201	150	170	168	177
Travel Distance (mi)	1345	1230	1300	1169	1278	1270	1287
Travel Time (hr)	55.9	50.1	54.3	40.0	45.9	48.8	56.1
Total Delay (hr)	24.8	21.7	24.3	13.0	16.3	19.4	26.5
Total Stops	1028	890	957	623	728	845	1069
Fuel Used (gal)	47.1	43.5	45.7	38.2	43.0	43.2	46.6

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1038	1077	1047	1053
Vehs Exited	1136	1153	1132	1127
Starting Vehs	246	287	245	249
Ending Vehs	148	211	160	167
Travel Distance (mi)	1258	1289	1245	1267
Travel Time (hr)	51.3	64.4	45.6	51.2
Total Delay (hr)	22.1	34.5	16.9	21.9
Total Stops	889	1403	707	913
Fuel Used (gal)	43.4	47.9	41.8	44.1

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1080	1032	1058	1065	999	1001	1063
Vehs Exited	1075	1017	1090	1030	1001	996	1074
Starting Vehs	162	161	201	150	170	168	177
Ending Vehs	167	176	169	185	168	173	166
Travel Distance (mi)	1214	1191	1227	1207	1140	1148	1235
Travel Time (hr)	44.1	41.6	42.3	42.1	39.1	40.6	47.5
Total Delay (hr)	15.9	14.1	13.9	14.3	12.7	14.0	18.8
Total Stops	698	646	624	629	597	592	760
Fuel Used (gal)	40.5	39.8	40.3	39.7	37.4	38.4	42.2

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1058	1032	1038	1044
Vehs Exited	1017	1056	1030	1038
Starting Vehs	148	211	160	167
Ending Vehs	189	187	168	173
Travel Distance (mi)	1208	1173	1177	1192
Travel Time (hr)	44.0	53.5	40.4	43.5
Total Delay (hr)	16.0	26.4	13.2	15.9
Total Stops	723	973	605	682
Fuel Used (gal)	40.7	42.7	39.0	40.1

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1047	1059	1108	1086	1091	1056	1070
Vehs Exited	1043	1059	1117	1099	1065	1059	1066
Starting Vehs	167	176	169	185	168	173	166
Ending Vehs	171	176	160	172	194	170	170
Travel Distance (mi)	1200	1213	1241	1237	1216	1207	1196
Travel Time (hr)	44.6	44.8	45.4	45.1	44.3	43.5	41.6
Total Delay (hr)	16.8	16.7	16.6	16.6	16.1	15.6	13.8
Total Stops	708	764	763	786	726	748	669
Fuel Used (gal)	40.2	40.8	41.8	41.3	40.6	40.1	39.0

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1073	1064	1059	1070
Vehs Exited	1075	1065	1074	1072
Starting Vehs	189	187	168	173
Ending Vehs	187	186	153	172
Travel Distance (mi)	1237	1221	1211	1218
Travel Time (hr)	45.7	50.2	43.6	44.9
Total Delay (hr)	17.1	21.8	15.5	16.7
Total Stops	757	840	761	751
Fuel Used (gal)	41.4	43.1	40.7	40.9

Queuing and Blocking Report
2025 Build

2025 Build PM
01/09/2020

Intersection: 1: Olde Forge Drive/RV Parkway & Warrenton Rd (Rte.17)/Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	TR	L	T	TR	L	LTR
Maximum Queue (ft)	992	983	276	342	344	269	263
Average Queue (ft)	505	502	143	128	149	162	145
95th Queue (ft)	886	881	310	402	412	267	257
Link Distance (ft)	1890	1890		922	922	874	874
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			300				
Storage Blk Time (%)	27		11	0			
Queuing Penalty (veh)	0		83	0			

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	T	TR	L	R
Maximum Queue (ft)	101	81	80	20	113	77
Average Queue (ft)	43	4	4	1	40	29
95th Queue (ft)	86	87	86	10	110	61
Link Distance (ft)		922	922	1625	695	695
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100				
Storage Blk Time (%)	2					
Queuing Penalty (veh)	16					

Intersection: 3: Lendall Ln (1015)/Solomon Drive & Warrenton Rd (Rte.17 Bus.)

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LTR	L	T	R
Maximum Queue (ft)	166	488	500	63	43	365	391	87	195	139	131	105
Average Queue (ft)	34	230	241	5	4	175	170	3	88	69	15	25
95th Queue (ft)	101	430	445	32	24	338	339	52	162	132	88	64
Link Distance (ft)		1625	1625			2215	2215		526		674	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		170			50	105		260		125		140
Storage Blk Time (%)			13	20	0		14	2		5		0
Queuing Penalty (veh)			7	5	0		1	1		2		0

Network Summary

Network wide Queuing Penalty: 115



Appendix J: Queuing Analysis (2025) at US 17 Business and Glenalice Lane

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:25	8:25	8:25	8:25	8:25	8:25	8:25
Total Time (min)	70	70	70	70	70	70	70
Time Recorded (min)	55	55	55	55	55	55	55
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3714	3655	3837	3716	3626	3643	3661
Vehs Exited	3729	3680	3826	3761	3647	3629	3669
Starting Vehs	170	175	170	180	187	140	161
Ending Vehs	155	150	181	135	166	154	153
Travel Distance (mi)	4158	4137	4310	4237	4123	4134	4105
Travel Time (hr)	168.5	159.4	197.4	183.5	166.6	159.8	155.4
Total Delay (hr)	71.1	62.9	96.8	84.9	70.6	63.6	59.6
Total Stops	4023	3741	5646	4779	3989	3746	3506
Fuel Used (gal)	148.0	145.5	158.3	153.8	147.2	145.0	143.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:25	8:25	8:25	8:25
Total Time (min)	70	70	70	70
Time Recorded (min)	55	55	55	55
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3690	3775	3686	3702
Vehs Exited	3669	3757	3689	3706
Starting Vehs	149	174	153	164
Ending Vehs	170	192	150	159
Travel Distance (mi)	4155	4271	4134	4176
Travel Time (hr)	174.6	179.0	156.6	170.1
Total Delay (hr)	78.1	79.5	59.8	72.7
Total Stops	4613	4541	3483	4208
Fuel Used (gal)	149.4	153.2	144.8	148.9

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time 7:30

End Time 7:45

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1113	1072	1175	1148	1117	1063	1054
Vehs Exited	1065	1035	1057	1047	1052	1029	1032
Starting Vehs	170	175	170	180	187	140	161
Ending Vehs	218	212	288	281	252	174	183
Travel Distance (mi)	1221	1205	1246	1248	1231	1216	1178
Travel Time (hr)	53.7	47.3	55.8	60.0	54.9	51.0	46.0
Total Delay (hr)	25.0	19.1	26.8	30.8	26.2	22.6	18.5
Total Stops	1373	1116	1547	1743	1432	1325	1021
Fuel Used (gal)	44.6	42.7	45.2	46.7	44.9	43.5	41.8

Interval #1 Information Int 1

Start Time 7:30

End Time 7:45

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1124	1148	1070	1109
Vehs Exited	1014	1075	1042	1046
Starting Vehs	149	174	153	164
Ending Vehs	259	247	181	228
Travel Distance (mi)	1229	1261	1201	1224
Travel Time (hr)	53.5	57.4	47.8	52.7
Total Delay (hr)	25.1	28.0	19.7	24.2
Total Stops	1483	1578	1054	1367
Fuel Used (gal)	44.6	46.4	42.3	44.3

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	988	963	995	944	914	924	1008
Vehs Exited	1057	1038	1053	1057	1017	964	1014
Starting Vehs	218	212	288	281	252	174	183
Ending Vehs	149	137	230	168	149	134	177
Travel Distance (mi)	1147	1135	1172	1136	1121	1047	1126
Travel Time (hr)	48.9	45.9	62.0	54.6	48.8	40.2	44.2
Total Delay (hr)	22.0	19.5	34.7	28.1	22.8	15.8	17.8
Total Stops	1207	1173	1979	1563	1249	933	1065
Fuel Used (gal)	41.5	40.6	45.1	42.6	40.8	37.0	39.5

Interval #2 Information Int 2

Start Time 7:45

End Time 8:00

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	907	937	944	952
Vehs Exited	1010	1009	980	1019
Starting Vehs	259	247	181	228
Ending Vehs	156	175	145	160
Travel Distance (mi)	1074	1100	1074	1113
Travel Time (hr)	50.5	47.4	40.1	48.2
Total Delay (hr)	25.6	21.8	15.0	22.3
Total Stops	1504	1286	890	1286
Fuel Used (gal)	39.6	40.0	37.9	40.5

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	957	983	990	999	916	989	956
Vehs Exited	948	973	1050	1013	933	947	988
Starting Vehs	149	137	230	168	149	134	177
Ending Vehs	158	147	170	154	132	176	145
Travel Distance (mi)	1059	1085	1146	1134	1036	1100	1088
Travel Time (hr)	38.6	40.0	51.3	43.4	36.1	38.7	39.8
Total Delay (hr)	13.8	14.7	24.4	17.1	12.0	13.3	14.3
Total Stops	849	885	1478	977	727	809	855
Fuel Used (gal)	36.9	37.8	42.0	39.6	35.5	37.4	37.4

Interval #3 Information Int 3

Start Time 8:00

End Time 8:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1001	984	999	978
Vehs Exited	989	993	971	981
Starting Vehs	156	175	145	160
Ending Vehs	168	166	173	158
Travel Distance (mi)	1113	1131	1103	1099
Travel Time (hr)	43.0	41.8	40.4	41.3
Total Delay (hr)	17.0	15.6	14.5	15.7
Total Stops	1028	867	908	940
Fuel Used (gal)	39.3	39.2	38.0	38.3

Interval #4 Information Int 4

Start Time 8:15

End Time 8:25

Total Time (min) 10

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	656	637	677	625	679	667	643
Vehs Exited	659	634	666	644	645	689	635
Starting Vehs	158	147	170	154	132	176	145
Ending Vehs	155	150	181	135	166	154	153
Travel Distance (mi)	730	713	747	719	735	770	713
Travel Time (hr)	27.3	26.1	28.4	25.5	26.7	29.9	25.5
Total Delay (hr)	10.3	9.5	10.9	8.9	9.6	11.9	9.0
Total Stops	594	567	642	496	581	679	565
Fuel Used (gal)	25.1	24.4	26.0	24.8	26.0	27.1	24.9

Interval #4 Information Int 4

Start Time 8:15

End Time 8:25

Total Time (min) 10

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	658	706	673	664
Vehs Exited	656	680	696	659
Starting Vehs	168	166	173	158
Ending Vehs	170	192	150	159
Travel Distance (mi)	739	779	757	740
Travel Time (hr)	27.6	32.4	28.3	27.8
Total Delay (hr)	10.4	14.2	10.6	10.5
Total Stops	598	810	631	614
Fuel Used (gal)	25.8	27.6	26.5	25.8

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	WB	WB	B7	B7	SB	SB
Directions Served	L	T	TR	T	T	L	R
Maximum Queue (ft)	42	63	64	10	14	82	104
Average Queue (ft)	11	6	6	0	1	30	47
95th Queue (ft)	35	62	61	11	19	71	88
Link Distance (ft)		227	227	1341	1341	700	700
Upstream Blk Time (%)		0	0				
Queuing Penalty (veh)		2	2				
Storage Bay Dist (ft)	100						
Storage Blk Time (%)							
Queuing Penalty (veh)							

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4351	4311	4494	4402	4300	4288	4302
Vehs Exited	4380	4316	4450	4388	4389	4290	4294
Starting Vehs	195	176	203	198	257	185	191
Ending Vehs	166	171	247	212	168	183	199
Travel Distance (mi)	4995	4959	5101	5001	4991	4908	4896
Travel Time (hr)	186.6	183.7	226.3	192.1	212.5	186.9	182.4
Total Delay (hr)	70.7	68.7	108.2	76.6	96.7	73.5	68.9
Total Stops	3125	3113	4623	3487	4326	3287	3065
Fuel Used (gal)	170.3	168.0	183.6	171.5	177.0	167.9	165.9

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	5:45	5:45	5:45	5:45
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4393	4407	4374	4363
Vehs Exited	4379	4459	4377	4371
Starting Vehs	178	222	172	193
Ending Vehs	192	170	169	185
Travel Distance (mi)	5033	5111	4986	4998
Travel Time (hr)	193.6	222.4	191.8	197.8
Total Delay (hr)	77.1	104.1	76.3	82.1
Total Stops	3443	4523	3389	3642
Fuel Used (gal)	173.1	184.2	171.4	173.3

Interval #0 Information Seeding

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Int 1

Start Time 4:45

End Time 5:00

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1169	1150	1230	1192	1164	1151	1085
Vehs Exited	1140	1090	1154	1155	1167	1111	1076
Starting Vehs	195	176	203	198	257	185	191
Ending Vehs	224	236	279	235	254	225	200
Travel Distance (mi)	1327	1284	1364	1327	1329	1293	1245
Travel Time (hr)	54.0	49.9	58.0	55.0	62.2	55.4	49.0
Total Delay (hr)	23.2	20.1	26.5	24.2	31.5	25.4	20.2
Total Stops	951	936	1167	1129	1433	1099	878
Fuel Used (gal)	46.4	43.9	48.1	46.5	48.7	46.3	43.1

Interval #1 Information Int 1

Start Time 4:45

End Time 5:00

Total Time (min) 15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1189	1197	1197	1169
Vehs Exited	1141	1140	1138	1130
Starting Vehs	178	222	172	193
Ending Vehs	226	279	231	236
Travel Distance (mi)	1344	1355	1322	1319
Travel Time (hr)	57.3	63.9	55.7	56.0
Total Delay (hr)	26.2	32.6	25.1	25.5
Total Stops	1148	1403	1106	1125
Fuel Used (gal)	47.7	50.4	46.5	46.8

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1048	1054	1077	1050	1053	1085	1057
Vehs Exited	1124	1127	1145	1095	1105	1154	1097
Starting Vehs	224	236	279	235	254	225	200
Ending Vehs	148	163	211	190	202	156	160
Travel Distance (mi)	1236	1266	1289	1246	1261	1281	1234
Travel Time (hr)	44.6	45.7	57.4	46.6	57.5	49.1	44.8
Total Delay (hr)	16.0	16.3	27.5	17.9	28.4	19.5	16.2
Total Stops	737	682	1141	849	1226	845	706
Fuel Used (gal)	41.7	42.6	46.4	42.6	45.5	44.1	41.6

Interval #2 Information Int 2

Start Time 5:00

End Time 5:15

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1081	1076	1039	1061
Vehs Exited	1149	1122	1088	1121
Starting Vehs	226	279	231	236
Ending Vehs	158	233	182	175
Travel Distance (mi)	1281	1266	1243	1260
Travel Time (hr)	50.3	58.0	46.4	50.0
Total Delay (hr)	20.6	28.7	17.6	20.9
Total Stops	903	1302	791	917
Fuel Used (gal)	44.5	46.7	42.4	43.8

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1053	1063	1064	1091	1031	1054	1050
Vehs Exited	1033	1043	1041	1080	1015	1040	1034
Starting Vehs	148	163	211	190	202	156	160
Ending Vehs	168	183	234	201	218	170	176
Travel Distance (mi)	1187	1212	1196	1232	1177	1200	1176
Travel Time (hr)	42.0	44.7	52.1	44.4	49.0	42.4	40.9
Total Delay (hr)	14.4	16.5	24.5	16.1	21.5	14.8	13.6
Total Stops	623	731	1066	684	936	687	602
Fuel Used (gal)	39.8	41.3	42.9	41.5	41.3	39.8	38.7

Interval #3 Information Int 3

Start Time 5:15

End Time 5:30

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1050	1070	1061	1059
Vehs Exited	1041	1104	1061	1049
Starting Vehs	158	233	182	175
Ending Vehs	167	199	182	189
Travel Distance (mi)	1217	1274	1211	1208
Travel Time (hr)	42.8	56.5	44.1	45.9
Total Delay (hr)	14.6	27.2	16.1	17.9
Total Stops	615	1097	695	774
Fuel Used (gal)	40.7	46.1	40.8	41.3

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1081	1044	1123	1069	1052	998	1110
Vehs Exited	1083	1056	1110	1058	1102	985	1087
Starting Vehs	168	183	234	201	218	170	176
Ending Vehs	166	171	247	212	168	183	199
Travel Distance (mi)	1244	1198	1253	1196	1223	1133	1241
Travel Time (hr)	46.0	43.4	58.8	46.1	43.8	40.0	47.6
Total Delay (hr)	17.2	15.7	29.8	18.4	15.4	13.8	19.0
Total Stops	814	764	1249	825	731	656	879
Fuel Used (gal)	42.4	40.2	46.2	41.0	41.5	37.6	42.6

Interval #4 Information Int 4

Start Time 5:30

End Time 5:45

Total Time (min) 15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1073	1064	1077	1070
Vehs Exited	1048	1093	1090	1071
Starting Vehs	167	199	182	189
Ending Vehs	192	170	169	185
Travel Distance (mi)	1191	1216	1211	1211
Travel Time (hr)	43.3	44.0	45.5	45.9
Total Delay (hr)	15.8	15.7	17.5	17.8
Total Stops	777	721	797	820
Fuel Used (gal)	40.3	41.1	41.8	41.5

Intersection: 2: Warrenton Rd (Rte.17 Bus.) & Glenalice Ln

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (ft)	107	120	32	26	36	57	77
Average Queue (ft)	42	5	1	2	3	21	32
95th Queue (ft)	86	100	33	23	29	53	63
Link Distance (ft)		922	922	220	220	700	700
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		100					
Storage Blk Time (%)		2					
Queuing Penalty (veh)		19					