Old Ivy Residences

Traffic Impact Analysis

Albemarle County, Virginia

July 19, 2021

Revised November 15, 2021

Revised February 4, 2022



Prepared For:

Greystar Real Estate Partners

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1 EXECUTIVE SUMMARY

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

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

1.1 PROJECT OVERVIEW

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

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

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

Table 1-1: Trip Generation Comparison

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

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

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

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

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

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

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

1.2 PROJECT SCOPE

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

1. Data Collection – Peak hour (7-9 AM and 4-6 PM) directional turning movement counts were performed on Thursday, May 6, 2021, at five (5) intersections within the study area. The raw data collected has been included in Appendix A.

2. Background Traffic Growth – A 1% growth rate was applied to the existing 2021 volumes to reach the background 2025 volumes.

3. Trip Generation – Traffic generated by the proposed development was estimated using the 10th edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*.

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

5. Traffic Projections – Future traffic volumes were determined using the existing traffic counts, a 1% background growth rate, and the trips generated by the proposed site.

6. Operational and Queuing Analysis – Level of service, delay, and queuing calculations were completed at the study intersections for 2021 existing, 2025 background, and 2025 future conditions using SYNCHRO Version 10 with SimTraffic. The 95th percentile queue lengths (SYNCHRO) and maximum queues (SimTraffic) were reviewed at the study intersections.

1.3 Study Findings

Based on the operational analyses the following is offered:

- Under the 2021 existing and 2025 background conditions:
    - The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS D in the AM and PM peaks, with queues in both mainline approaches and the southbound approach that create access issues to nearby entrances and intersections.
    - At the unsignalized intersection of Old Ivy Road and US Route 29/250 Off-Ramp, the combination of queues from the Ivy Road/Canterbury Road signal and the high volume from the US Route 29/250 Off-Ramp block access for the eastbound and westbound movements of Old Ivy Road, effectively creating a 4-way stop intersection. The US Route 29/250 Off Ramp experiences queues that extend to mainline US Route 29/250.
    - The unsignalized intersection of Old Ivy Road and Faulconer Road sees queuing issues for southbound traffic attempting to make a left onto Old Ivy Road during both peak hours. The queues at Old Ivy Road extend downstream into the US Route 29/250 Off-Ramp, which could create safety and operational issues on the ramp.
    - The unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp does not have any operational or queuing issues of note, with maximum queues of approximately 300' in the EB direction which do not interfere with other intersections or access points.
    - The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak. The only queuing issues noted are for through movement queues blocking access to nearby commercial entrances.
    - On either end of the study corridor, there are narrow railroad bridges over Old Ivy Road that severely limit the ability to widen the roadway and sometimes require vehicles to operate as if there were only a single lane. This constraint impacts the intersections of Old Ivy Road at Ivy Road, Old Ivy Road at US Route 29/250 Off-Ramp, and Ivy Road at Canterbury Road.

- Under 2025 total future conditions with the traffic from the proposed Old Ivy Road Development:
    - Overall, all existing intersections see an increase in delays and queuing with the addition of the proposed site traffic.
    - The signalized intersection of Ivy Road and Canterbury Road continues to create operational issues for the US Route 29/250 Off-Ramp, Old Ivy Road, and Faulconer Road. Without improvements to the signalized intersection or the off-ramp, operations on Old Ivy Road will not improve.
    - At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the additional site traffic does not significantly increase delays along Old Ivy Road.
    - At the signalized intersection of Old Ivy Road and Ivy Road, the increased traffic volumes do not significantly change the operations of the existing signal.
    - The proposed site entrance does not introduce any queueing or delays for mainline Old Ivy Road and the proposed turn lanes can fully accommodate the site-generated traffic.

1.4 RECOMMENDATIONS

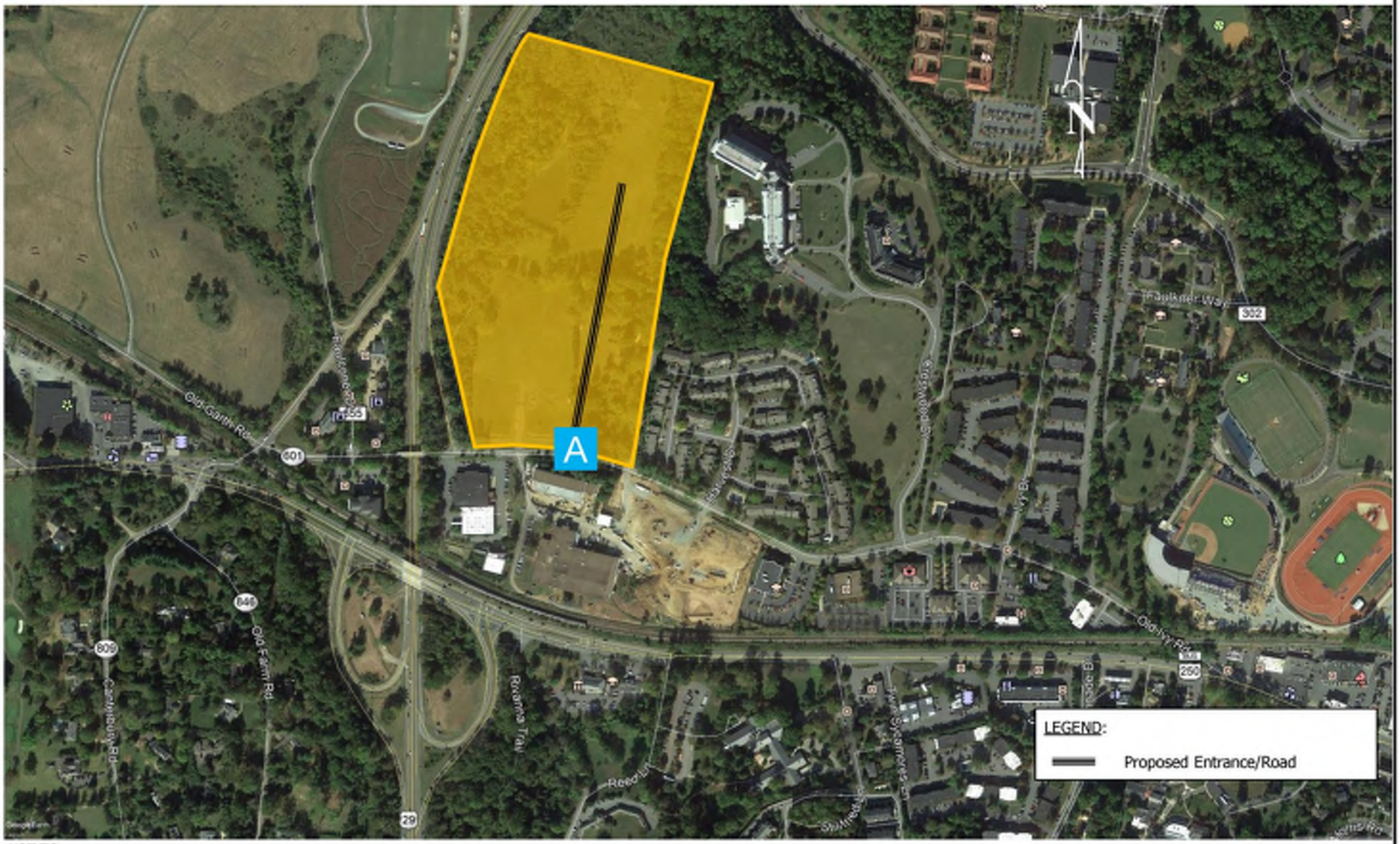
In order to accommodate the increased traffic volumes associated with the proposed Old Ivy Residences residential development, the following operational and capacity improvements are recommended:

1. Install an eastbound left turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.

2. Install a westbound right turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.

3. Install a westbound right turn lane on Old Ivy Road at the US Route 29/250 on-ramp.

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

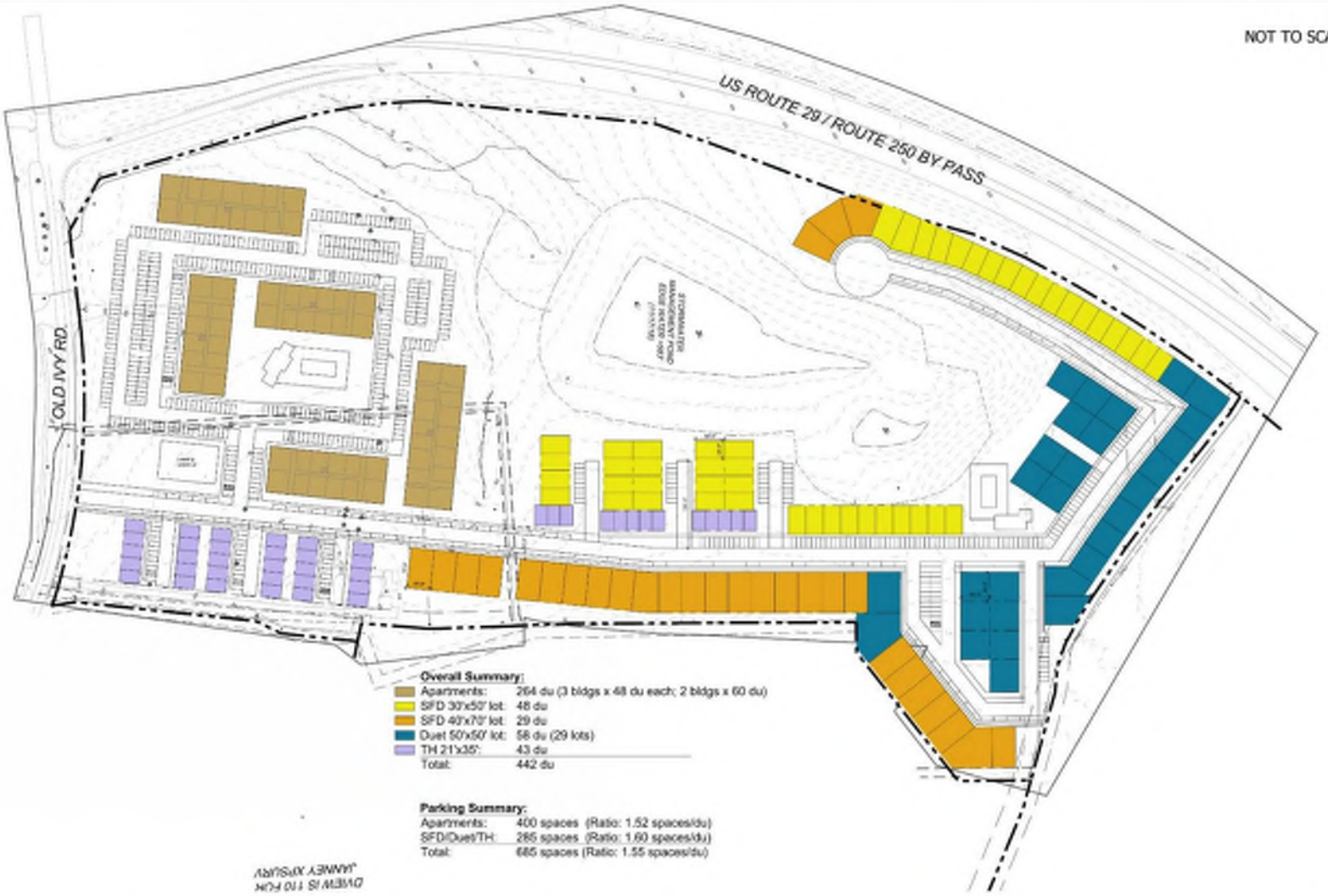


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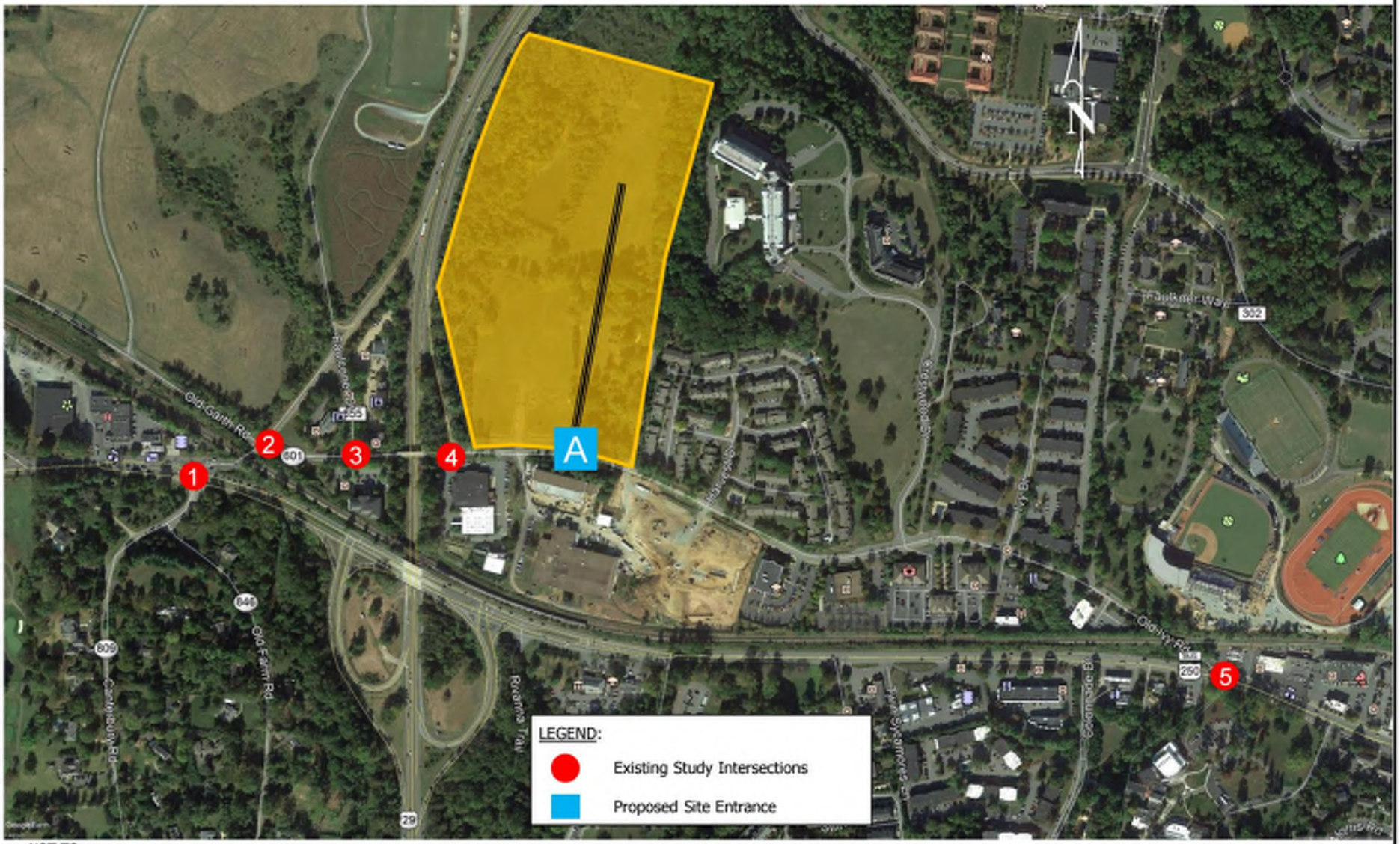
Vicinity Map
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure 1-1



Conceptual Layout
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure 1-2



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Study Intersections
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure 1-3

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2 ANALYSIS OF EXISTING CONDITIONS

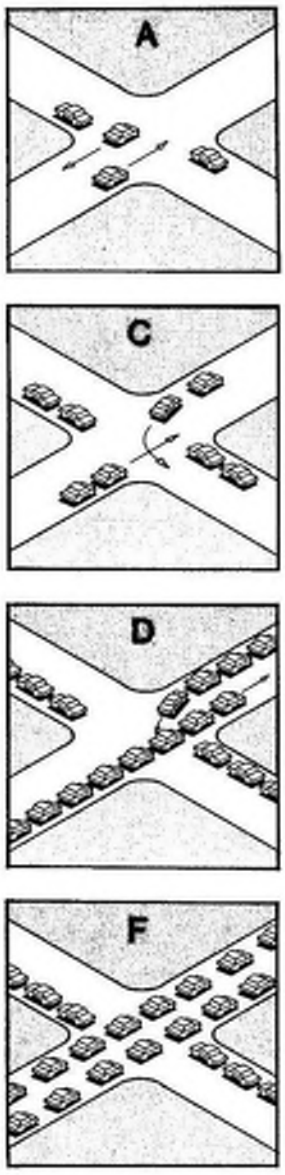
2.1 CAPACITY ANALYSES

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

Table 2-1: Level of Service Definitions

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

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



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

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

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

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

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

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

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

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

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

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

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

2.2 Existing Conditions

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

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

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

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

The existing roadways within the study area include the following:

- Old Ivy Road is a two-lane, undivided major collector with a posted speed limit of 35 mph. According to 2019 VDOT count data, Old Ivy Road services 8,300 vehicles per day.

- Ivy Road (US Route 250) is a two-lane, undivided minor arterial with a posted speed limit of 35 mph. According to 2019 VDOT count data, Ivy Road services 13,000 vehicles per day between Dick Woods Road and US Route 29 and 58,000 vehicles per day between US Route 29 and the Charlottesville city limits.

- Falconer Drive is a two-lane, undivided local road with a posted speed limit of 30 mph. According to 2019 VDOT count data, Faulconer Drive services 1,300 vehicles per day.

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

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

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

2.3 2021 Existing Conditions Analysis

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

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

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

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

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

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

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

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

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

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

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

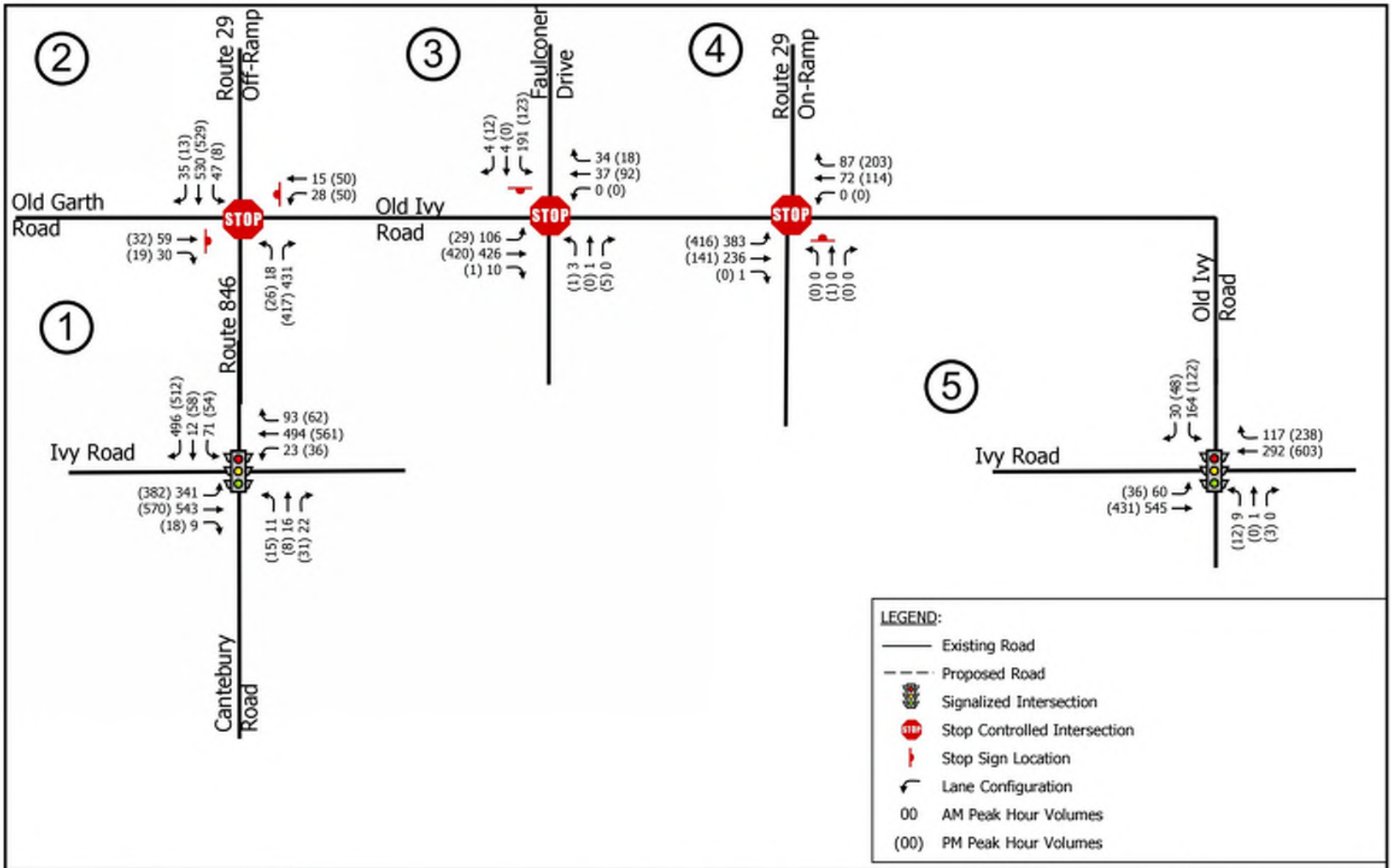
† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

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

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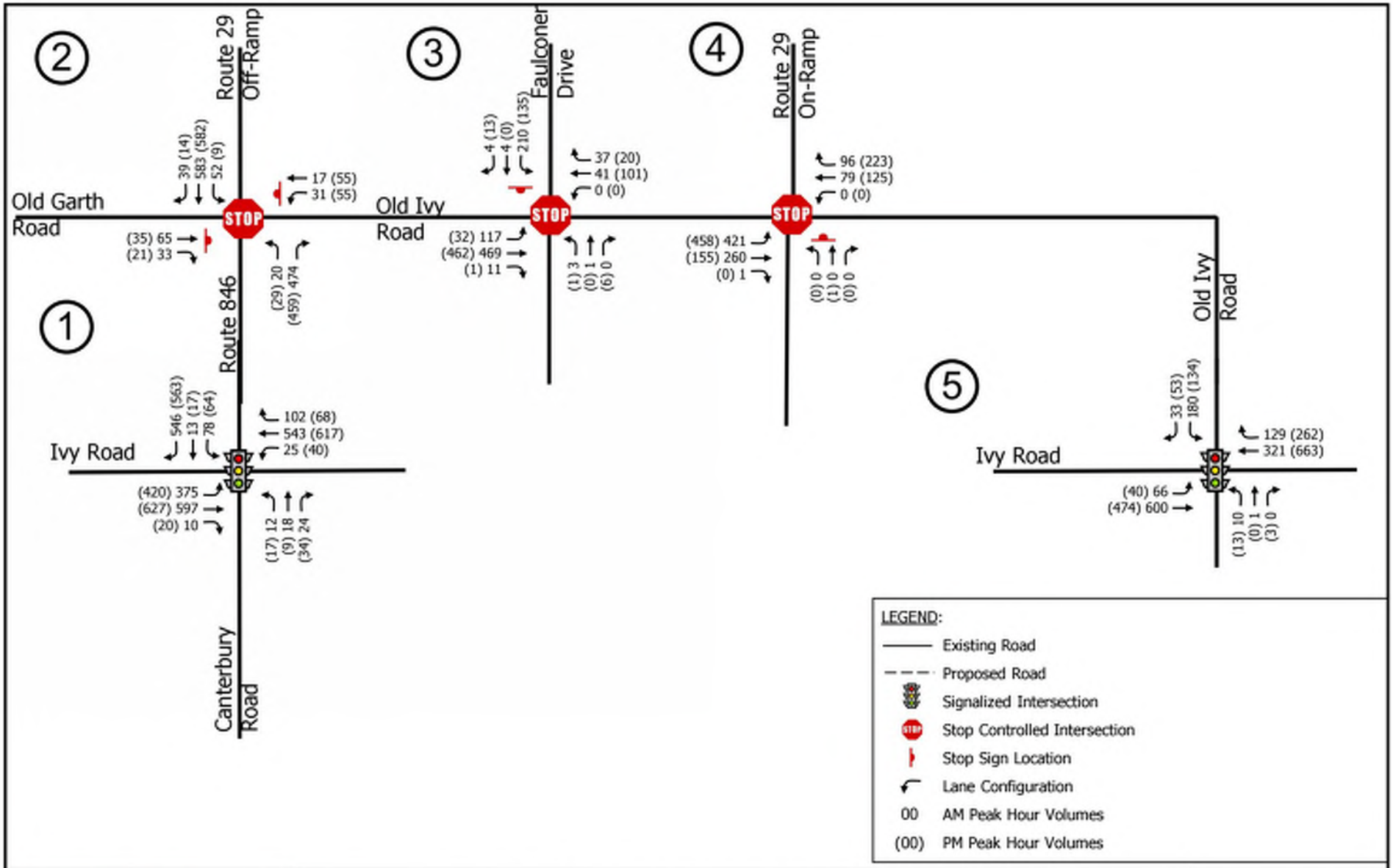
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2021 Existing Volumes
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

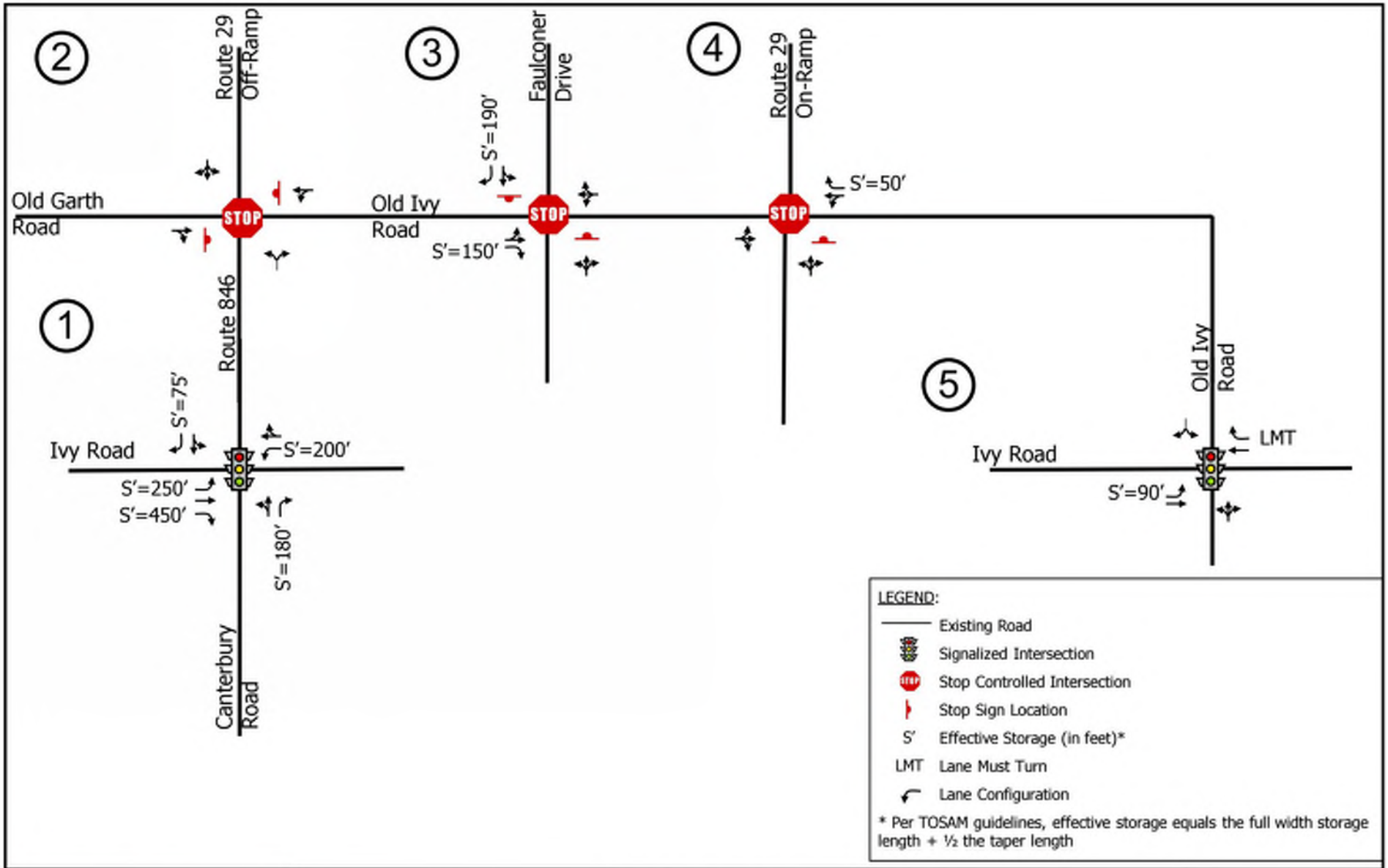
Figure 2-1



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2021 Adjusted Existing Volumes
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure 2-2



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Existing Geometry
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure
2-3

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3 ANALYSIS OF BACKGROUND CONDITIONS

3.1 2025 Background Traffic Growth

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

3.2 2025 Background Conditions Analysis

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

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

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

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

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

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

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

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

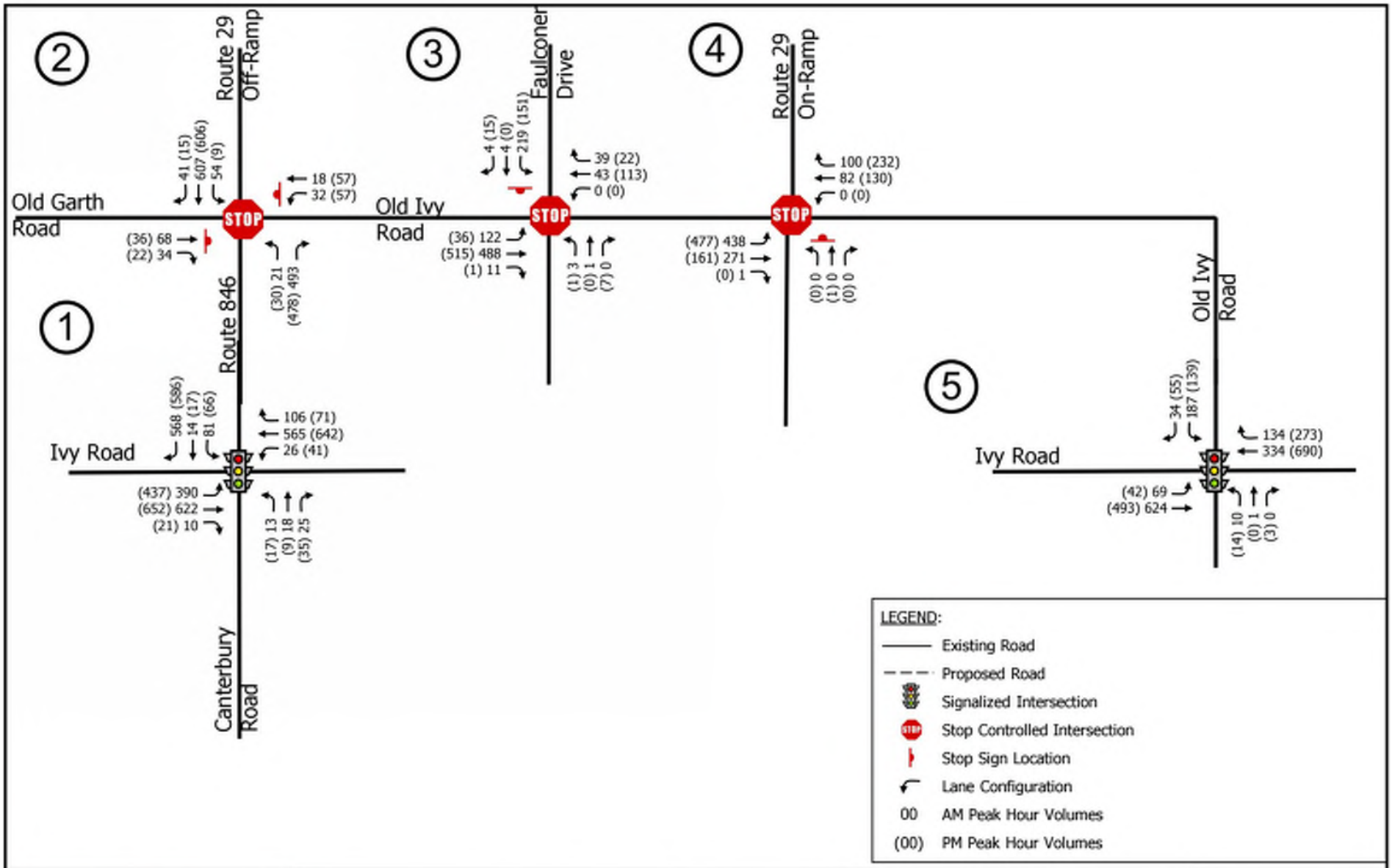
Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic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

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

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

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

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2025 Background Volumes
Old Ivy Residences – Traffic Impact Analysis
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Figure
3-1

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4 SITE TRIP GENERATION AND DISTRIBUTION

4.1 TRIP GENERATION

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

Table 4-1: Trip Generation Summary

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

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

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

4.2 SITE TRIP DISTRIBUTION

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

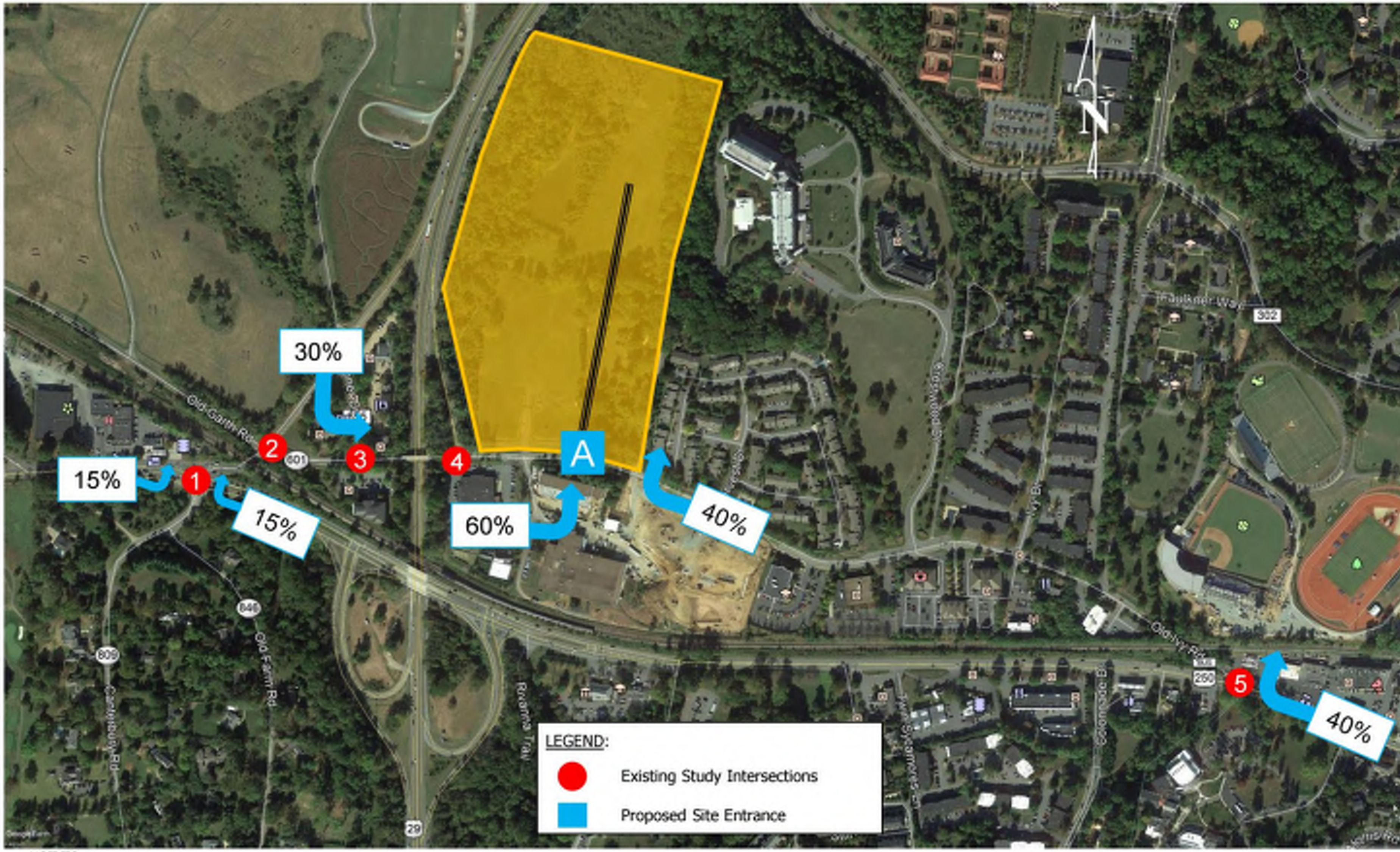
The global trip distributions are shown on Figure 4-1 and the proposed trip distributions by study intersection are shown on Figure 4-2.

4.3 SITE TRIP ASSIGNMENT

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

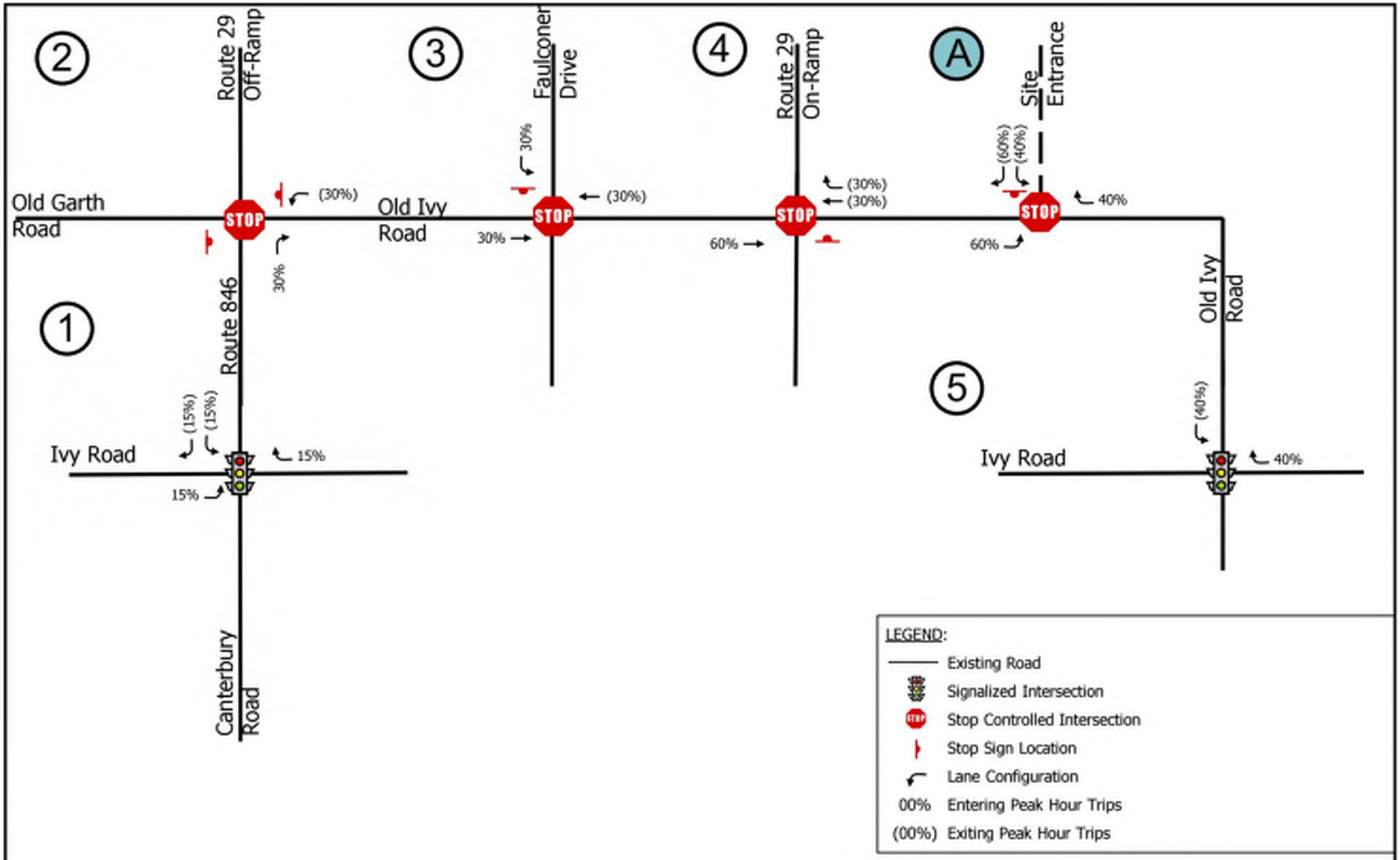
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NOT TO SCALE

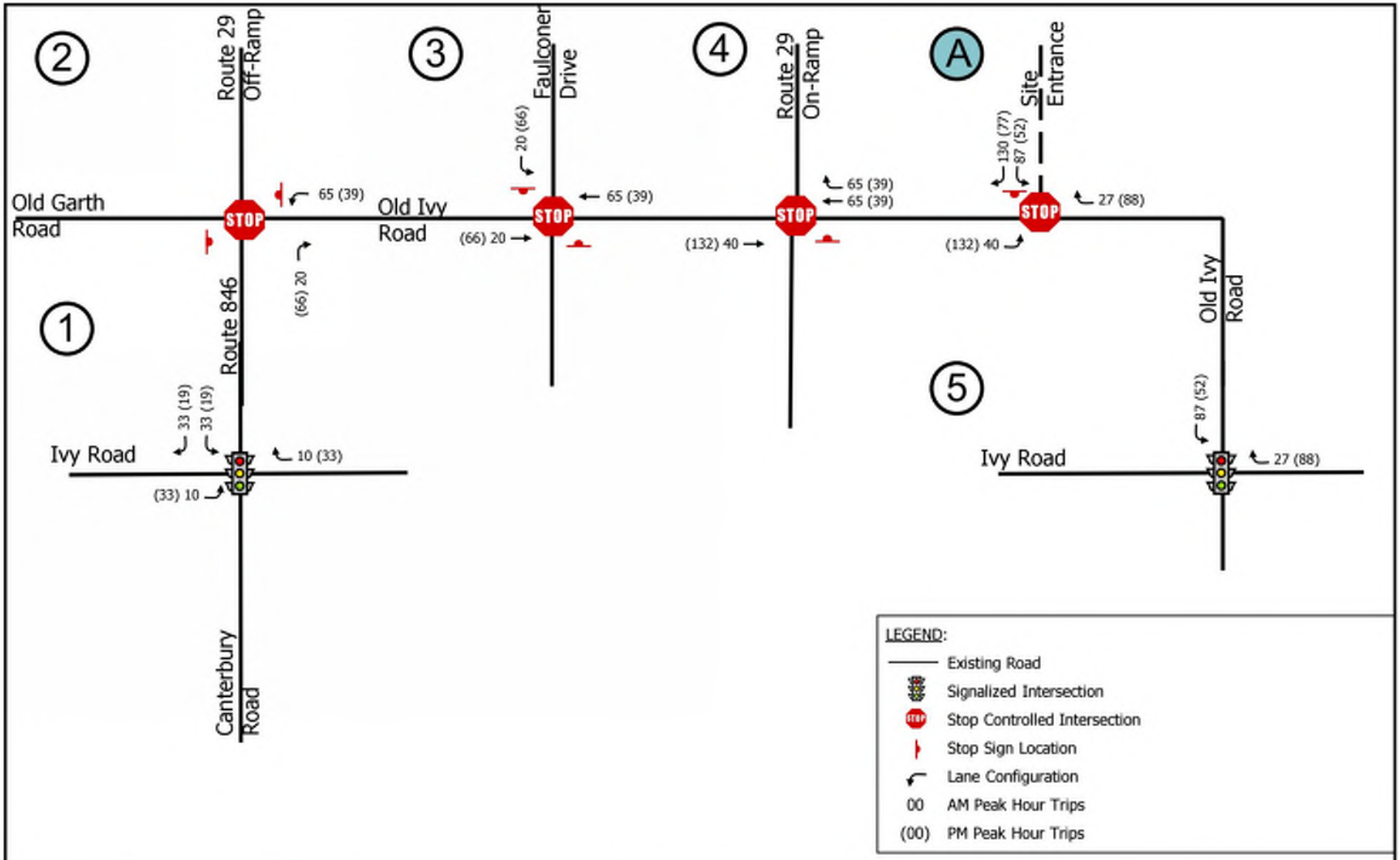
TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Global Trip Distribution Old Ivy Residences – Traffic Impact Analysis Albemarle County, Virginia	Figure 4-1



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Trip Distribution
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure
4-2



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Generated Trips
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure
4-3

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5 ANALYSIS OF FUTURE CONDITIONS WITH DEVELOPMENT

5.1 2025 Total Traffic Volumes

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

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

5.2 2025 Future Conditions Analysis

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

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

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

At the unsignalized intersection of Old Ivy Road and Faulconer Road, the southbound approach operates at LOS F in the AM and PM peaks. In the southbound direction the maximum queue is 268 feet in the AM peak and 218 feet in the PM peak. The eastbound and westbound approaches of Old Ivy Road operate at LOS A during both peak hours.

At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the mainline eastbound and westbound approaches operate at LOS A during both peak hours. The northbound approach operates at LOS A during the AM peak hour and at LOS F during the PM peak hour. However, the maximum queue on the northbound approach during either peak hour is 47 feet, or approximately 2 vehicles. There are no queuing issues at this intersection.

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

At the proposed site entrance, the southbound approach operates at a LOS B in the AM peak and LOS C in the PM peak. In the eastbound direction, there is a maximum queue of 44 feet in the AM peak and 70 feet in the PM peak. The mainline movements along Old Ivy Road at the proposed site entrance are not adversely impacted by the introduction of the site traffic and the queues will not impact through traffic.

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

Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Maximum Queue Length (ft)
1.Ivy Road(E-W) at	EB Left		52.1	D	#498	453	71.6	E	#611	621
Cantebury Road/Route 846 (N-S)	EB Thru		18.8	B	499	386	19.0	B	493	504
Signalized	EB Right	450	10.2	B	0	26	10.5	B	0	29
	EB Approach		*31.6*	*C*	--	--	*40.5*	*D*	--	--
	WB Left	200	22.1	C	18	199	20.9	C	23	200
	WB Thru-Right		112.1	F	#904	640	113.7	F	#930	624
	WB Approach		*108.8*	*F*	--	--	*108.9*	*F*	--	--
	NB Left-Thru		55.4	E	60	68	55.2	E	51	72
	NB Right	180	53.8	D	0	43	53.9	D	0	55
	NB Approach		*54.7*	*D*	--	--	*54.5*	*D*	--	--
	SB Thru-Left		71.4	E	#196	214	61.7	E	141	212
	SB Right	75	56.9	E	#651	75	54.5	D	#653	76
	SB Approach		*59.5*	*E*	--	--	*55.6*	*E*	--	--
	Overall		**61.8**	**E**	--	--	**64.7**	**E**	--	--
2.Old Ivy Road (E-W) at	EB Thru-Right		75.7	F	110	117	34.4	D	35	85
29 Off Ramp/Route 846 (N-S)	*EB Approach*		*75.7*	*F*	--	--	*34.4*	*D*	--	--
Unsignalized	WB Left-Thru		544.2	F	285	149	140.1	F	205	184
	WB Approach		*544.2*	*F*	--	--	*140.1*	*F*	--	--
	NB L-T-R		0.7	A	2	69	0.9	A	3	84
	NB Approach		*0.7*	*A*	--	--	*0.9*	*A*	--	--
	SB L-T-R	190	1.5	A	5	1163	0.3	A	1	1150
	SB Approach		*1.5*	*A*	--	--	*0.3*	*A*	--	--
3.Old Ivy Road (E-W) at	EB Left-Thru		2.3	A	8	89	0.7	A	2	90
Faulconer Road/Commercial Ent	EB Right	150	0.0	A	0	0	0.0	A	0	0
Unsignalized	*EB Approach*		*2.3*	*A*	--	--	*0.7*	*A*	--	--
	WB L-T-R		0.0	A	0	3	0.0	A	0	5
	WB Approach		*0.0*	*A*	--	--	*0.0*	*A*	--	--
	NB L-T-R		21.8	C	0	25	13.2	B	1	30
	NB Approach		*21.8*	*C*	--	--	*13.2*	*B*	--	--
	SB Left-Thru		176.1	F	1	268	62.1	F	183	218
	SB Right	190	0.0	A	336	41	0.0	A	0	76
	SB Approach		*176.1*	*F*	--	--	*62.1*	*F*	--	--
4. Old Ivy Road (E-W) at	EB L-T-R		7.7	A	47	198	9.4	A	64	324
Route 29 On-Ramp/	*EB Approach*		*7.7*	*A*	--	--	*9.4*	*A*	--	--
Commercial Entrance (N-S)	WB Left-Thru		0.0	A	0	0	0.0	A	0	0
Unsignalized	WB Right	250	0.0	A	0	39	0.0	A	0	47
	WB Approach		*0.0*	*A*	--	--	*0.0*	*A*	--	--
	NB L-T-R		0.0	A	0	0	93.1	F	2	16
	NB Approach		*0.0*	*A*	--	--	*93.1*	*F*	--	--
5.Ivy Road(E-W) at	EB Left	250	9.2	A	48	85	9.2	A	38	86
Old Ivy Road (N-S)	EB Thru		16.6	B	#475	320	11.2	B	285	244
Signalized	*EB Approach*		*15.8*	*B*	--	--	*11.1*	*B*	--	--
	WB Thru		10.8	B	189	206	16.8	B	#519	352
	WB Right		8.9	A	34	71	8.6	A	50	116
	Wb Approach		*10.2*	*B*	--	--	*14.0*	*B*	--	--
	NB L-T-R		34.5	C	21	40	29.5	C	0	43
	NB Approach		*34.5*	*C*	--	--	*29.5*	*C*	--	--
	SB L-T-R		28.9	C	166	238	25.1	C	117	194
	SB Approach		*28.9*	*C*	--	--	*25.1*	*C*	--	--
	Overall		**16.8**	**B**	--	--	**14.8**	**B**	--	--
A. Old Ivy Road (E-W) at	EB Left	150	7.8	A	3	44	8.7	A	11	70
Site Entrance (N)	EB Thru		*0.0*	A	--	--	*0.0*	A	--	--
Unsignalized	*EB Approach*		*1.0*	*A*	--	--	*3.9*	*A*	--	--
	WB Thru		0.0	†	0	0	0.0	†	0	0
	WB Right	150	0.0	†	0	0	0.0	†	0	12
	WB Approach		*0.0*	*†*	--	--	*0.0*	*†*	--	--
	SB Left-Right		14.5	B	45	103	16.2	C	32	96
	SB Approach		*14.5*	*B*	--	--	*16.2*	*C*	--	--

[1] *Overall intersection LOS and delay reported for signalized intersections and roundabouts only.*

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

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

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5.3 YEAR-TO-YEAR ANALYSIS COMPARISON

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

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

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

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

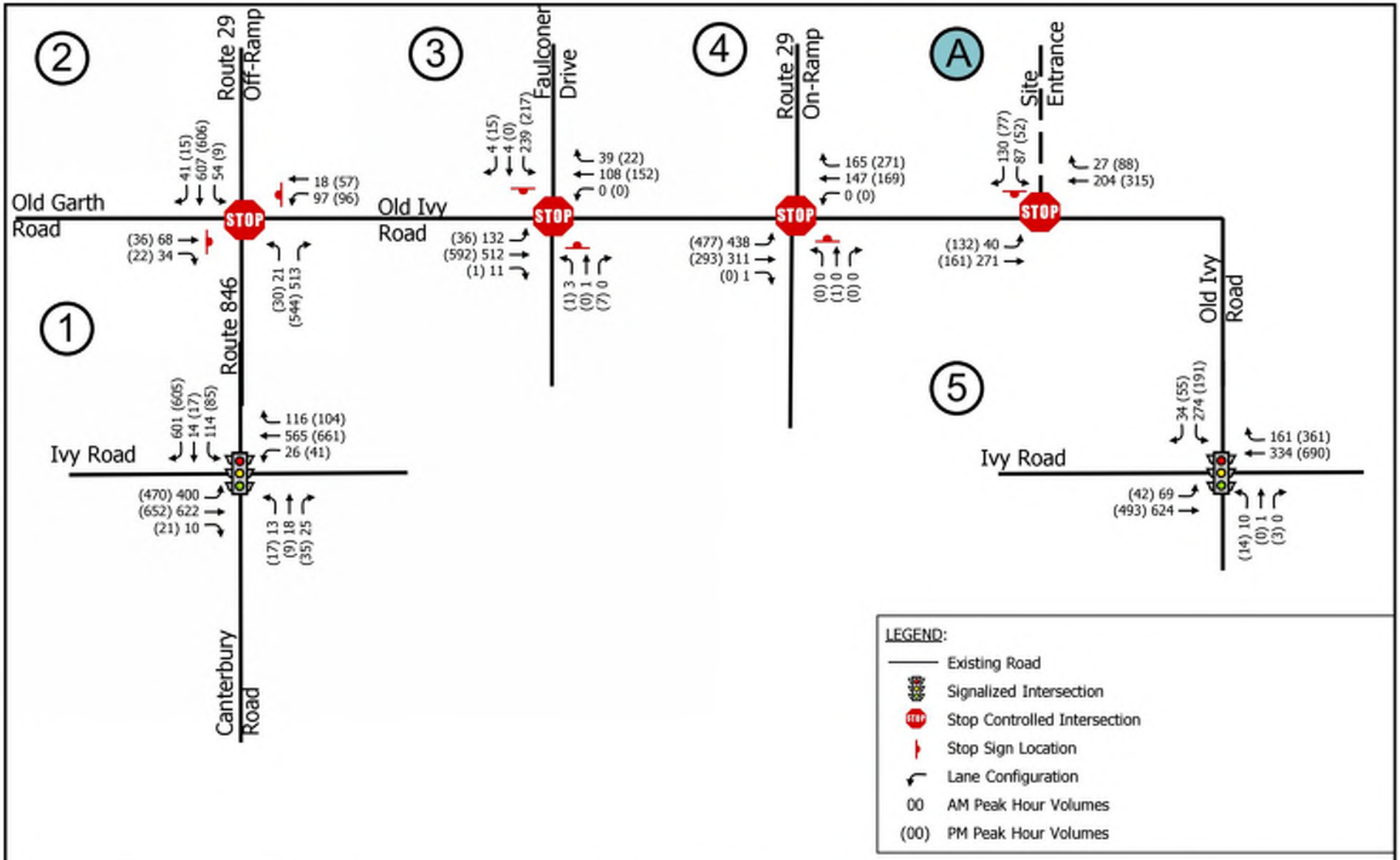
At the unsignalized intersection of Old Ivy Road and the US Route 29/250 On-Ramp, all 3 analyzed conditions show acceptable levels of service and minimal delays. The addition of site traffic does not impact the operations of the Old Ivy Road mainline approaches. The northbound approach from the parking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

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

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

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

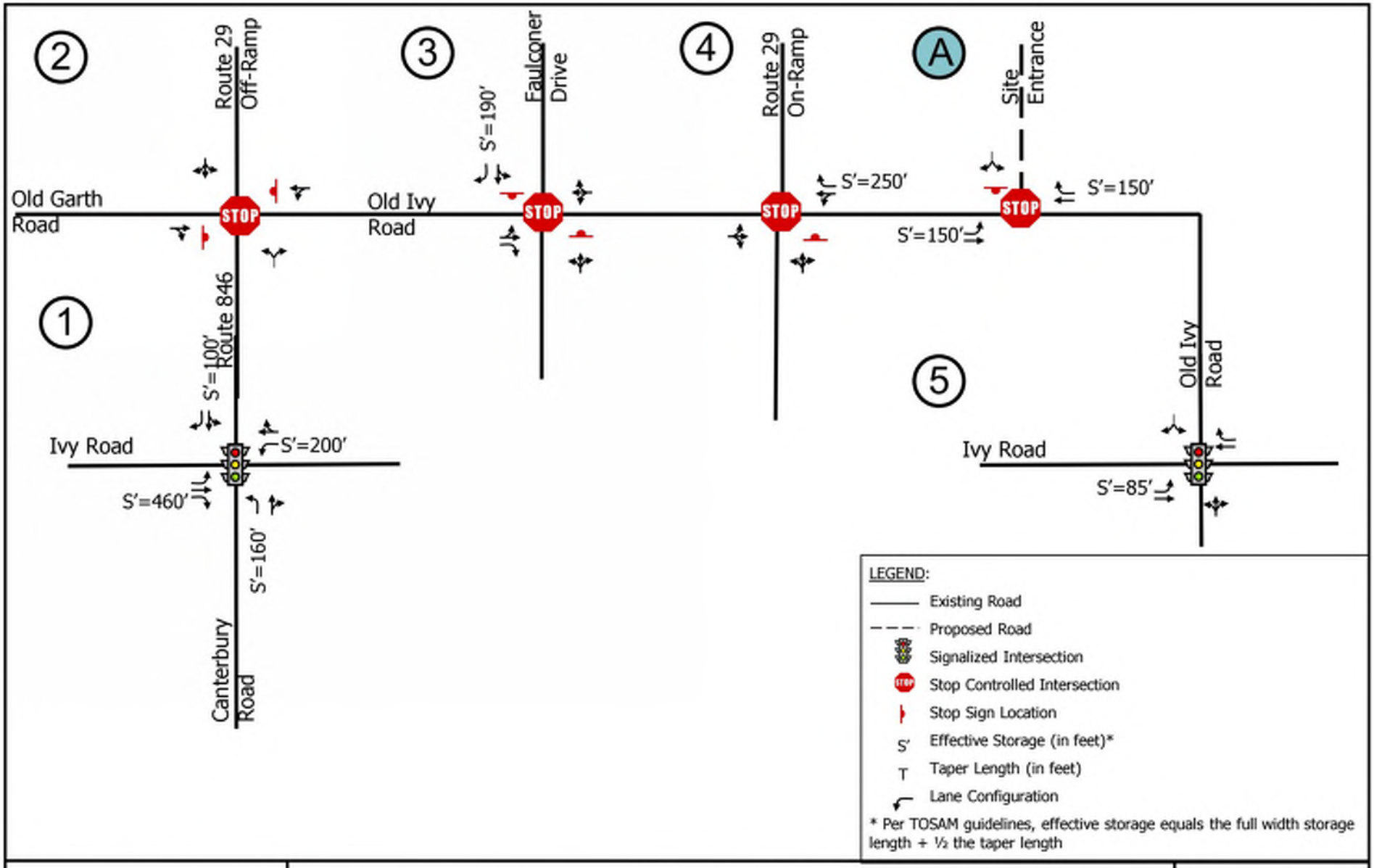
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2025 Future Volumes
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure 5-1



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Future Geometry
Old Ivy Residences – Traffic Impact Analysis
Albemarle County, Virginia

Figure
5-2

6 TURN LANE WARRANT ANALYSIS

6.1 2025 Future Conditions Analysis

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

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

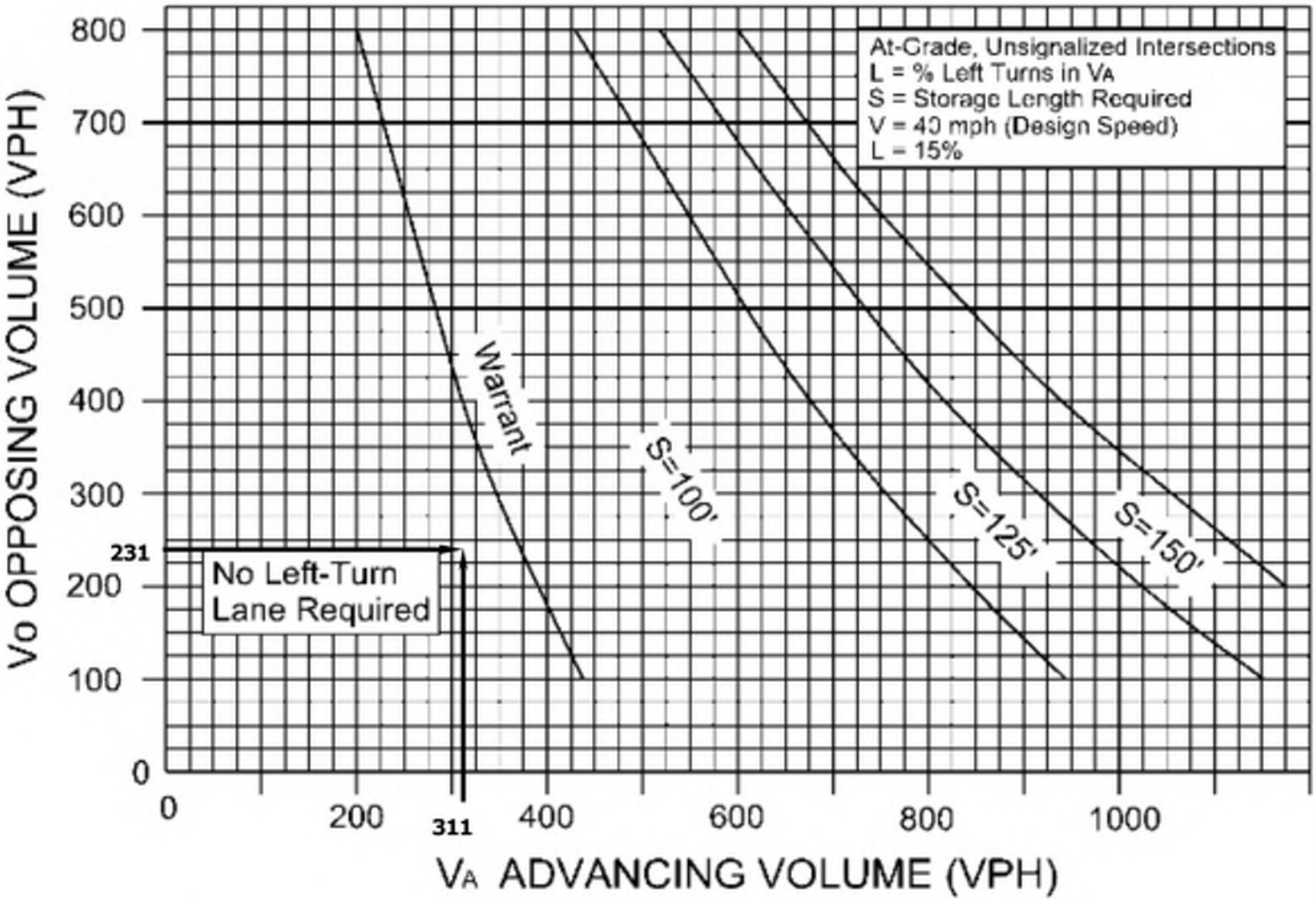
Under 2025 future conditions, both an eastbound left and a westbound right turn lane are warranted on Old Ivy Road at the proposed site entrance. The left and right turn lane warrants can be found in Figures 6-1 through 6-3.

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

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

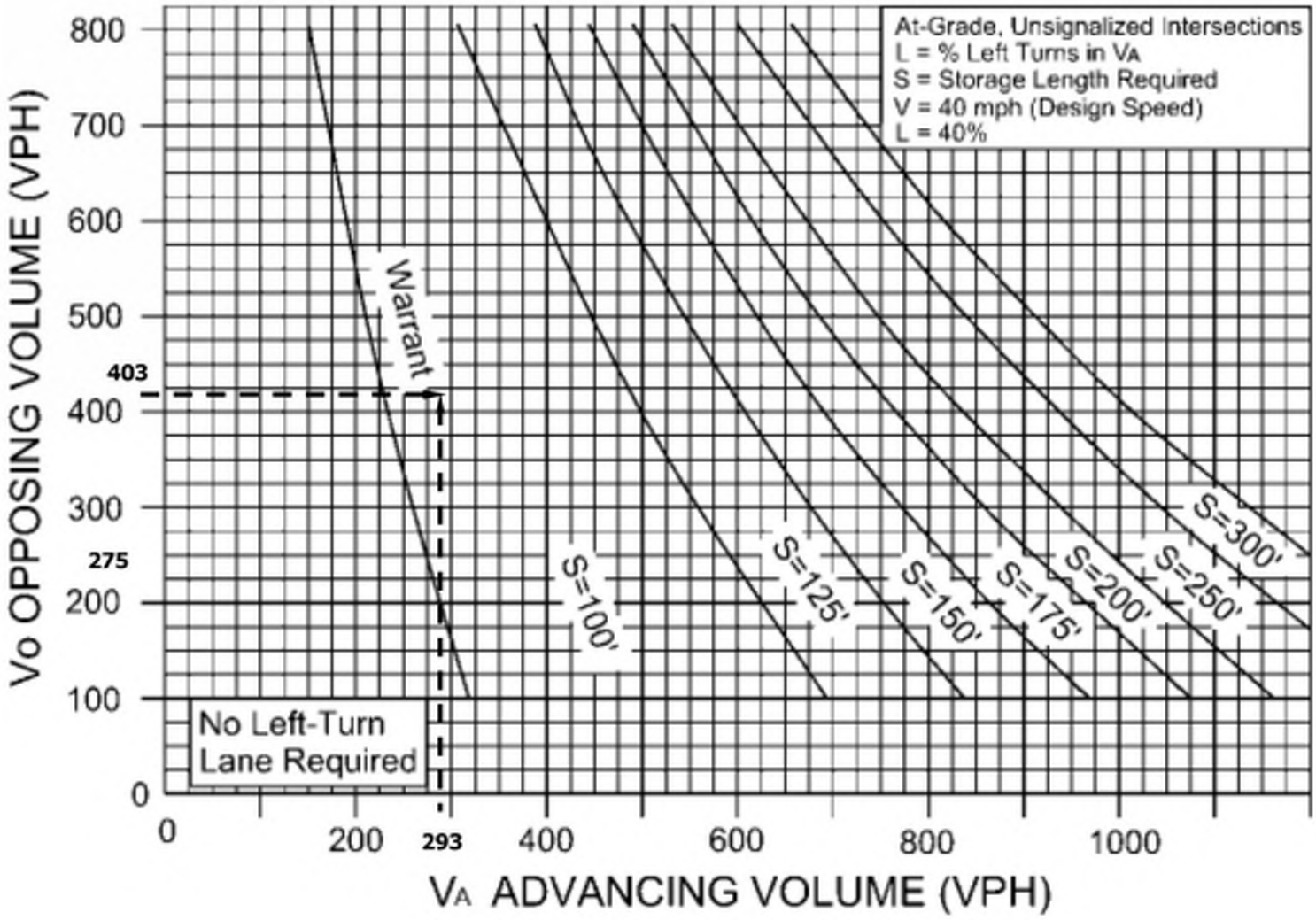


LEGEND
AM Peak Hour
PM Peak Hour

NO LEFT TURN LANE WARRANTED

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Left-Turn Lane Warrant 2025 Total Future Volume - AM Peak EB Old Ivy Road at Proposed Site Entrance	Figure 6-1

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



LEGEND
AM Peak Hour
PM Peak Hour

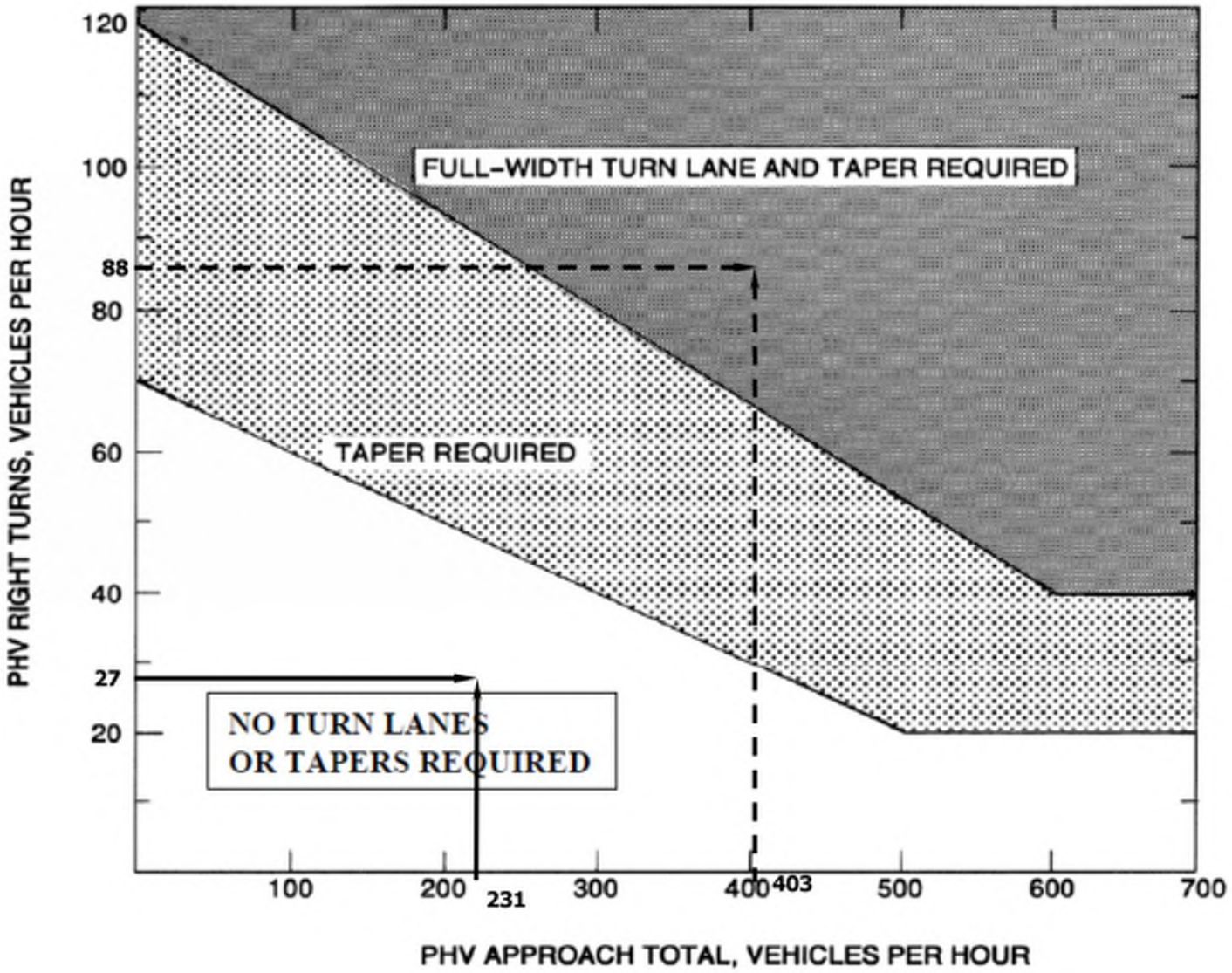
LEFT TURN LANE WARRANTED

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Left-Turn Lane Warrant
2025 Total Future Volume - PM Peak
EB Old Ivy Road at Proposed Site Entrance

Figure
6-2

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



RIGHT TURN LANE AND TAPER WARRANTED

LEGEND
AM Peak Hour
PM Peak Hour

TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	Right-Turn Lane Guideline 2025 Total Future Volume WB Old Ivy Road at Proposed Site Entrance	Figure 6-3

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7 CONCLUSIONS AND RECOMMENDATIONS

7.1 STUDY FINDINGS

Based on the operational analyses the following is offered:

- Under the 2021 existing and 2025 background conditions:
    - The signalized intersection of Ivy Road and Canterbury Road operates at an overall LOS D in the AM and PM peaks, with queues in both mainline approaches and the southbound approach that create access issues to nearby entrances and intersections.
    - At the unsignalized intersection of Old Ivy Road and US Route 29/250 Off-Ramp, the combination of queues from the Ivy Road/Canterbury Road signal and the high volume from the US Route 29/250 Off-Ramp block access for the eastbound and westbound movements of Old Ivy Road, effectively creating a 4-way stop intersection. The US Route 29/250 Off Ramp experiences queues that extend to mainline US Route 29/250.
    - The unsignalized intersection of Old Ivy Road and Faulconer Road sees queuing issues for southbound traffic attempting to make a left onto Old Ivy Road during both peak hours. The queues at Old Ivy Road extend downstream into the US Route 29/250 Off-Ramp, which could create safety and operational issues on the ramp.
    - The unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp does not have any operational or queuing issues of note, with maximum queues of approximately 300' in the EB direction which do not interfere with other intersections or access points.
    - The signalized intersection of Ivy Road and Old Ivy Road operates at an overall LOS B in both the AM and PM peak. The only queuing issues noted are for through movement queues blocking access to nearby commercial entrances.
    - On either end of the study corridor, there are narrow railroad bridges over Old Ivy Road that severely limit the ability to widen the roadway and sometimes require vehicles to operate as if there were only a single lane. This constraint impacts the intersections of Old Ivy Road at Ivy Road, Old Ivy Road at US Route 29/250 Off-Ramp, and Ivy Road at Canterbury Road.

- Under 2025 total future conditions with the traffic from the proposed Old Ivy Road Development:
    - Overall, all existing intersections see an increase in delays and queuing with the addition of the proposed site traffic.
    - The signalized intersection of Ivy Road and Canterbury Road continues to create operational issues for the US Route 29/250 Off-Ramp, Old Ivy Road, and Faulconer Road. Without improvements to the signalized intersection or the off-ramp, operations on Old Ivy Road will not improve.
    - At the unsignalized intersection of Old Ivy Road at the US Route 29/250 On-Ramp, the additional site traffic does not significantly increase delays along Old Ivy Road.
    - At the signalized intersection of Old Ivy Road and Ivy Road, the increased traffic volumes do not significantly change the operations of the existing signal.
    - The proposed site entrance does not introduce any queueing or delays for mainline Old Ivy Road and the proposed turn lanes can fully accommodate the site-generated traffic.

7.2 RECOMMENDATIONS

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

1. Install an eastbound left turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.

2. Install a westbound right turn lane on Old Ivy Road at the proposed site entrance, minimum 100' storage and 100' taper.

3. Install a westbound right turn lane on Old Ivy Road at the US Route 29/250 on-ramp.

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