

Belmont Park

Traffic Impact Analysis

Stafford County, Virginia

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Prepared for:

Mid-Atlantic Real Estate
Investments, Inc.



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1 EXECUTIVE SUMMARY

This report presents the findings of the traffic impact analysis prepared for the proposed Belmont Park in Stafford County, Virginia. The proposed development is located on the southern side of US Route 17, west of Sanford Drive, northeast of Celebrate Virginia Parkway, and south of the VDOT Park and Ride lot in Stafford County, Virginia as shown on Figure 1-1 (all Figures are located at the end of the chapter).

The Applicant is seeking to rezone the approximately 173-acre site from agricultural (A-1) and residential (R-1) to a mixture of R-3, R-5, B-3, and UD-5. The proposed development will be built in two (2) phases with Phase 1 encompassing the northern portion of the site (closer to US Route 17) and Phase 2 including the Southern portion of the site (closer to Celebrate Virginia Parkway). See Figure 1-2 for the Generalized Development Plan. For purposes of this study, the development was assumed to include:

Phase 1:

- 435,400 S.F. of Retail Space;
- 162,500 S.F. of Office Space; and
- and 303 Multi-family Apartments.

Phase 2:

- 214 Age Restricted Townhomes;
- 198 Age Restricted Apartments; and
- A 100 bed Assisted Living Facility.

The project includes relocating the existing VDOT Park and Ride lot to the east with the current entrance roadway serving both the project and the Park and Ride lot. Access to the development will be provided via four (4) entrances.

1. A full movement entrance on US Route 17 at the existing signalized intersection of US Route 17/Falls Run Drive/VDOT Commuter Lot;
2. A right-in/right-out only entrance west of the US Route 17/Falls Run Drive/VDOT Commuter Lot intersection;
3. A right-in/right-out only entrance east of the US Route 17/Falls Run Drive/VDOT Commuter Lot intersection; and
4. A partial access (right-in/right-out/left-in) entrance on Celebrate Virginia Parkway.

The US Route 17 entrances would be constructed with Phase 1 and the Celebrate Virginia Parkway entrance constructed with Phase 2. For purposes of this analysis, Phase 1 of the development was assumed to be complete in 2023 and Phase 2 in 2028.

When complete, the proposed development will generate a total of 544 primary AM peak hour trips (339 in and 205 out), 1,162 primary PM peak hour trips (520 in and 642 out), 1,425 primary Saturday peak hour trips (748 in and 677 out), and 12,596 primary average weekday daily trips.

The purpose of this analysis is to determine the impact of the proposed development on the surrounding roadway network. The scope of this study was developed in conjunction with Stafford County and Virginia Department of Transportation (VDOT) staff at a scoping meeting held on November 14, 2017 and subsequent correspondence. A copy of the scoping agreement is included in Appendix A.

In accordance with the scoping agreement, the study area consists of the follow intersections (See Figure 1-3):

1. U.S. Route 17/Sanford Drive/Gateway Drive;
2. U.S. Route 17/McLane Drive;
3. U.S. Route 17/Falls Run Drive/VDOT Commuter Lot (includes Saturday analysis);
4. U.S. Route 17/Powell Lane;
5. U.S. Route 17/Plantation Drive/Commerce Parkway;
6. U.S. Route 17/Lichfield Boulevard/McWhirt Loop;
7. Celebrate Virginia Parkway/Banks Ford Road;
- 8a. U.S. Route 17/Site Entrance #1;
- 8b. U.S. Route 17/Site Entrance #2; and
- 8c. Celebrate Virginia Parkway/Site Entrance #3 (Phase 2 only).

In accordance with the scoping agreement, analyses were completed for the following scenarios:

1. 2018 Existing Traffic Conditions;
2. 2023 Background Traffic Conditions (without development of the site);
3. 2023 Future Traffic Conditions (with development of Phase 1 of the site);
4. 2028 Background Traffic Conditions (without development of the site);
5. 2028 Future Traffic Conditions (with full buildout of the site);
6. 2034 (Plus 6 Scenario) Background Traffic Conditions (without development of the site); and
7. 2034 (Plus 6 Scenario) Future Traffic Conditions (with full buildout of the site).

Each of the study intersections was analyzed under AM and PM peak hour conditions. The U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection was also analyzed under Saturday peak hour conditions.

The following steps were taken to determine the potential traffic impacts associated with this project:

1. Data Collection – VDOT provided data from recent traffic counts at study intersections 1,2,3,5 and 6 above. For study intersections 4 and 7, AM (7:00 – 9:00) and PM (4:00 – 6:00) peak hour turning movement counts were collected a typical weekday when public schools were in session. Saturday peak hour turning movement counts were conducted from 10:00 AM – 1:00 PM at the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection only.
2. Traffic Growth – In order to be conservative, a 2% annual growth rate was applied to the through movements only on U.S. Route 17.
3. Trip Generation – Traffic generated by the proposed development was estimated using the 9th edition of the Institute of Transportation Engineers' *Trip Generation Manual*.
4. Traffic Distributions – The distribution of trips generated by the proposed developed was based on the existing traffic volumes, the nature of the use, and local knowledge.
5. Traffic Projections – Future traffic volumes were determined using the existing traffic counts, a 2% growth rate on U.S. Route 17 through movements only, trips generated by other approved developments, and the trips generated by the site.
6. Traffic Capacity Analysis – Level of service calculations for existing, background, and future conditions were performed using SYNCHRO Version 9.2

7. Queuing Analysis – The 95th percentile queue lengths (Synchro) and maximum queues (SimTraffic) were reviewed at the intersections listed above.

This traffic impact analysis (TIA) has been prepared in accordance with (1) the procedures outlined in the Virginia Department of Transportation's (VDOT) Traffic Impact Analysis Regulations (henceforth referred to as Chapter 527), (2) the VDOT *Traffic Operations and Safety Analysis Manual (TOSAM)*, and (3) the Scope of Study agreed upon between Stafford County, VDOT, and Timmons Group (see Appendix A for the scoping agreement).

Based on the analyses the following is offered:

- Under 2018 existing conditions, each of the study intersections operate at an overall level of service (LOS) D or better in all peak hours. Each of the movements at the intersections also operate at LOS D or better in all peak hours with the exception of the mainline lefts and side-street approaches at the majority of the side street intersections along U.S. Route 17. \
- Under 2018 existing conditions, the queuing results indicate several of the mainline left turning movements along U.S. Route 17 spillback through the available storage in the AM and PM peak hours.
- Under 2018 existing conditions, field observations and experience in the corridor indicate southbound U.S. Route 17 experiences delay and significant queuing in the PM peak hour whenever there is a slow down or incident on I-95 southbound. This delay/queue is related to the I-95 traffic and will be addressed with the I-95 Southbound Rappahannock River Crossing Mega-Project discussed above.
- Under 2023 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.
- Due to the complimentary nature of the uses, the proposed mixed-use development will experience an internal reduction of 5% to 16% in each of the peak hours.
- The proposed development is a complimentary use to the existing VDOT Commuter Lot since the majority of the Commuter Lot trips enter before the AM peak hour and leave prior to the PM peak hour. Further, it is anticipated that up to 10% of the retail traffic associated with the proposed development will come from the Commuter Lot traffic.
- Given the location of the development along a major commuting corridor and adjacent to I-95, it is anticipated that up to 34% of traffic to the retail component of the project will be pass-by trips already on U.S. Route 17 and not new trips to the roadway network.
- With development of Phase 1 of the proposed project in 2023, the operations the majority of the study intersections would experience minimal to no changes in levels of service or queueing compared to background conditions.
- With Phase 1 of the proposed development in 2023, the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection would degrade from an overall LOS C/B/B (AM/PM/Sat peak hours) under background conditions to an overall LOS B/E/F (AM/PM/Sat peak hours). The northbound left turn from U.S. Route 17 into the site will operate at an overall LOS F with queues that extend beyond the available storage. All other site entrances operate at LOS C or better in all peak hours.

- Under 2028 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.
- Under 2028 future conditions (with full buildout of the site), the majority of the study intersections would operate at comparable LOS and queueing to background conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.
- The diversion of site traffic with the Celebrate Virginia Parkway entrance improves the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection. The intersection would operate better under 2028 conditions than under 2023 conditions.
- Under 2034 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.
- Under 2034 future conditions, the majority of the study intersections would operate at comparable LOS and queueing to 2028 conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.



Belmont Park
 Site Location Map
 Stafford County, Virginia

Figure
 1-1



BELMONT PARK
 GENERALIZED DEVELOPMENT PLAN - MASTER PLAN
 January 25, 2019



Belmont Park
 Generalized Development Plan
 Stafford County, Virginia

Figure
 1-2



NOT TO SCALE



Belmont Park
 Study Area Intersections
 Stafford County, Virginia

Figure
 1-3

2 BACKGROUND INFORMATION

2.1 DESCRIPTION OF ON-SITE DEVELOPMENT

The proposed Belmont Park development is located on the southern side of US Route 17, west of Sanford Drive, northeast of Celebrate Virginia Parkway, and south of the VDOT Park and Ride lot in Stafford County, Virginia as shown on Figure 1-1.

The Applicant is seeking to rezone the approximately 173 acre site from agricultural (A-1) and residential (R-1) to a mixture of R-3, R-5, B-3, and UD-5. The proposed development will be built in two (2) phases with Phase 1 encompassing the northern portion of the site (closer to US Route 17) and Phase 2 including the Southern portion of the site (closer to Celebrate Virginia Parkway). See Figure 1-2 for the Generalized Development Plan. For purposes of this study, the development was assumed to include:

Phase 1:

- 435,400 S.F. of Retail Space;
- 162,500 S.F. of Office Space; and
- and 303 Multi-family Apartments.

Phase 2:

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- 198 Age Restricted Apartments; and
- A 100 bed Assisted Living Facility.

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3. A right-in/right-out only entrance east of the US Route 17/Falls Run Drive/VDOT Commuter Lot intersection; and
4. A partial access (right-in/right-out/left-in) entrance on Celebrate Virginia Parkway.

The US Route 17 entrances would be constructed with Phase 1 and the Celebrate Virginia Parkway entrance constructed with Phase 2. For purposes of this analysis, Phase 1 of the development was assumed to be complete in 2023 and Phase 2 in 2028.

2.2 STUDY LIMITS

As agreed upon in the scoping agreement, the study limits include the following existing intersections:

1. U.S. Route 17/Sanford Drive/Gateway Drive;
2. U.S. Route 17/McLane Drive;
3. U.S. Route 17/Falls Run Drive/VDOT Commuter Lot (includes Saturday analysis);
4. U.S. Route 17/Powell Lane;
5. U.S. Route 17/Plantation Drive/Commerce Parkway;

6. U.S. Route 17/Lichfield Boulevard/McWhirt Loop;
7. Celebrate Virginia Parkway/Banks Ford Road;
- 8a. U.S. Route 17/Site Entrance #1;
- 8b. U.S. Route 17/Site Entrance #2; and
- 8c. Celebrate Virginia Parkway/Site Entrance #3 (Phase 2 only).

2.3 EXISTING ROADWAYS NETWORK

U.S. Route 17 is a six to eight-lane, median divided principal arterial roadway within the study area with an average daily traffic (ADT) of 43,000 vehicles based on the latest available VDOT data (2017).

This section of U.S. Route 17 connects I-95 and the City of Fredericksburg to the east with commercial and residential development to the west before continuing on into Fauquier County. This section of U.S. Route 17 has a posted speed limit of 45 miles per hour.

For purposes of this analysis, U.S. Route 17 was assumed to run north/south through the study area.

Celebrate Virginia Parkway is a four-lane, median divided major collector roadway within the study area with an average daily traffic (ADT) of 1,100 vehicles based on the latest available VDOT data (2017).

Celebrate Virginia Parkway has a posted speed limit of 45 mph and connects U.S. Route 17 to the north with commercial and residential development to the south before terminating.

The remaining study roadways predominately provide access to residential or commercial development with occasional other uses.

The existing lane use and traffic control at the study intersections is shown on Figure 2-1.

2.4 FUTURE IMPROVEMENTS

Along U.S. Route 17, the existing southbound right turn lane will be converted to a thru-right turn lane from the Falls Run Drive/VDOT Commuter Lot entrance to the southbound I-95 on-ramp where the lane will become part of the reconstructed two-lane on ramp.

This conversion/interchange ramp improvement will be constructed with the I-95 Southbound Rappahannock River Crossing Mega-Project and was assumed to be in place for all future scenarios.

2.5 OTHER MODES OF TRANSPORTATION

In accordance with Chapter 527 regulations, this study also reviews the potential for walking, bicycling, and transit trips to and from the area.

Currently, there are sidewalks along both sides of U.S. Route 17 throughout most of the study area. There are crosswalks and pedestrian signals at most side street crossings along U.S. Route 17 and some which provide protected pedestrian crossing of U.S. Route 17.

There are no bicycle lanes or facilities along U.S. Route 17.

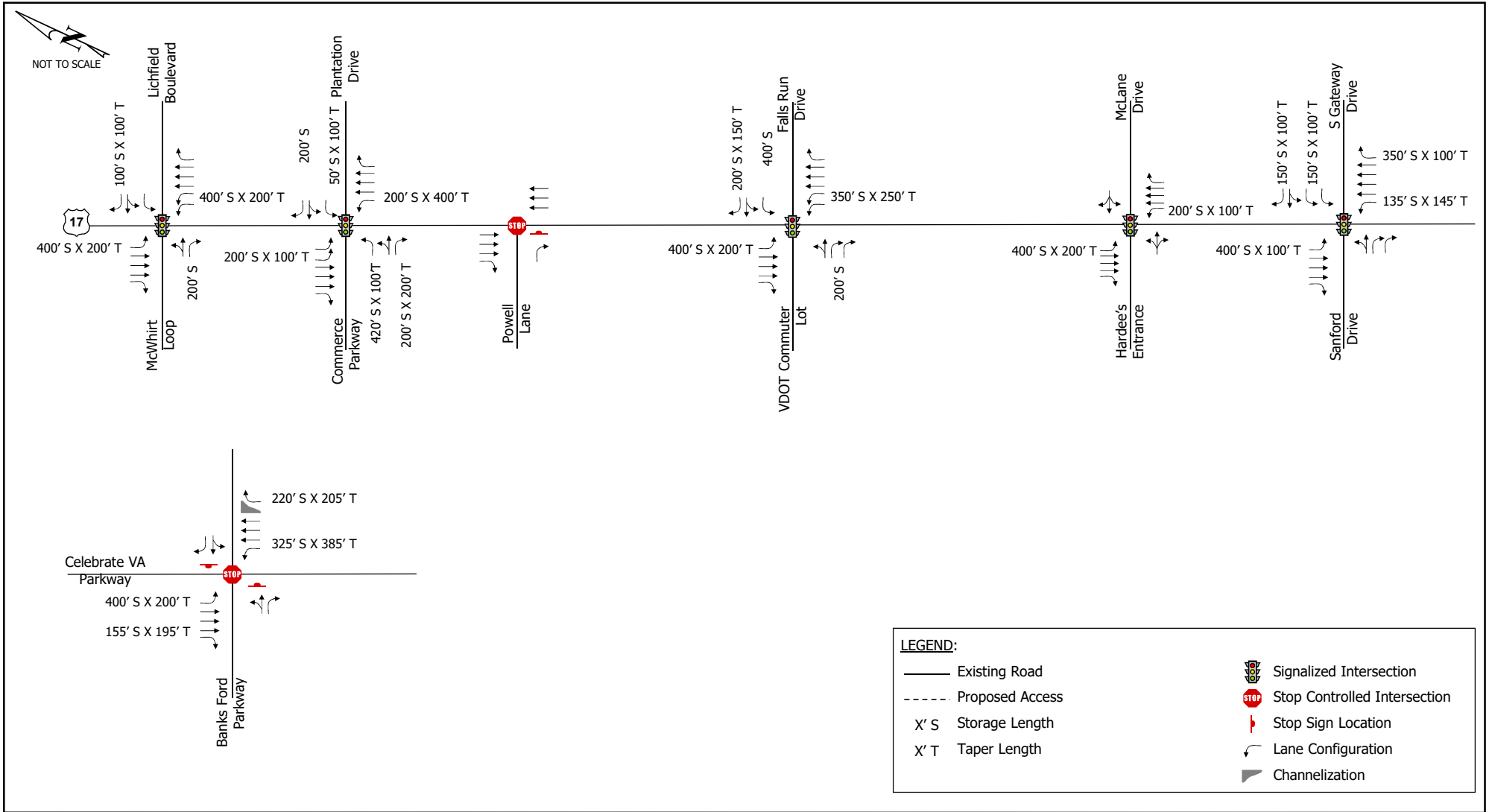
There is a shared use path along the eastern side of Celebrate Virginia Parkway which provides for both pedestrians and bicycles.

The Fredericksburg Regional Transit (FRED) system provides both commuter and local bus service within the vicinity of the site (via Route D2) with multiple stops along U.S. Route 17 including one at the VDOT Park and Ride Lot.

Further, the VDOT Commuter Lot provides 1,020 commuter parking spaces and is primarily used by travelers heading north on I-95. The majority of users of the lot enter well before the AM peak hour and exit before the PM peak hour.

While it is possible that some trips to the site will be made via walking, bicycle, and transit, given the nature of the use and the provided facilities, it is unlikely that a significant portion of trips would be made via these modes. To be conservative, no reduction in trips was taken for other modes of transportation.

However, as discussed further in the trip generation section below and agreed upon at scoping, an internal capture percentage was applied between the VDOT Park and Ride Lot and the retail uses in Belmont Park.



Belmont Park
Existing Lane Use and Traffic Control
Stafford County, Virginia

Figure
2-1

3 EXISTING CONDITIONS ANALYSIS

3.1 EXISTING TRAFFIC VOLUMES

VDOT provided data from recent traffic counts (conducted in 2017) at the following five (5) study intersections:

1. U.S. Route 17/Sanford Drive/Gateway Drive;
2. U.S. Route 17/McLane Drive;
3. U.S. Route 17/Falls Run Drive/VDOT Commuter Lot (includes Saturday analysis);
4. U.S. Route 17/Plantation Drive/Commerce Parkway;
5. U.S. Route 17/Lichfield Boulevard/McWhirt Loop;

Since the counts were conducted in 2017, a 2% growth rate was applied to the through movements on U.S. Route 17 to develop 2018 existing traffic count volumes.

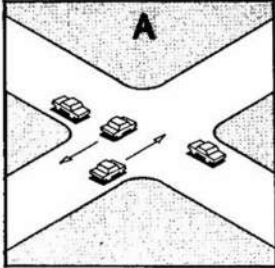
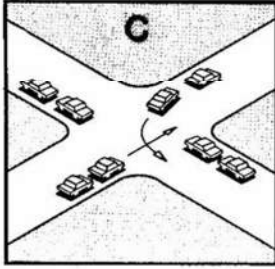
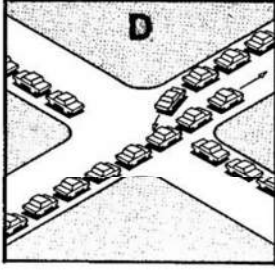
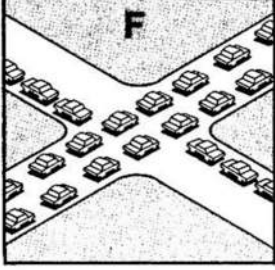
For the U.S. Route 17/Powell Lane and the Celebrate Virginia Parkway/Banks Ford Road intersections, AM (7:00 – 9:00) and PM (4:00 – 6:00) peak hour turning movement counts were collected a typical weekday when public schools were in session. Saturday peak hour turning movement counts were conducted from 11:00 AM – 1:00 PM at the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection only. All counts included heavy vehicles by movement and pedestrian counts.

A common peak hour was chosen for the intersections and indicates the AM peak hour occurs from 7:15 to 8:15 AM, the PM peak hour occurs from 4:45 to 5:45 PM and the Saturday peak hour occurs from 11:00 AM to 12:00 PM. The existing traffic data is summarized on Figure 3-1. The complete traffic data is included in Appendix B.

3.2 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 3-1 shows in detail how each of these levels of service are interpreted.

Table 3-1: Level of Service Definitions

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

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

For signalized and unsignalized intersections, level of service is defined in terms of **delay**, a measure of driver discomfort, frustration, fuel consumption and lost travel time. Table 3-2 summarizes the delay associated with each LOS category:

Table 3-2: 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"

Capacity analyses were performed to assess existing (2017), background (2018), and future (2018) operational conditions. The signalized and unsignalized intersections were analyzed using SYNCHRO Version 9.2 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);
- Heavy vehicle percentage as determined by the traffic counts (by movement); and
- Traffic signals timing data provided by VDOT. The cycle length and timings were held from existing to future conditions.

3.3 2018 EXISTING TRAFFIC CONDITIONS

Table 3-3 summarizes the 2018 existing intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2018 existing peak hour traffic volumes shown on Figure 3-1, the existing lane geometry shown on Figure 2-1, and the existing traffic signal timings as provided by VDOT. The corresponding analysis worksheets are included in Appendix C.

As indicated in Table 3-3, under 2017 existing conditions, each of the study intersections operate at an overall level of service (LOS) D or better in all peak hours. Each of the movements at the intersections also operate at LOS D or better in all peak hours with the exception of the mainline lefts and side-street approaches at the majority of the side street intersections along U.S. Route 17.

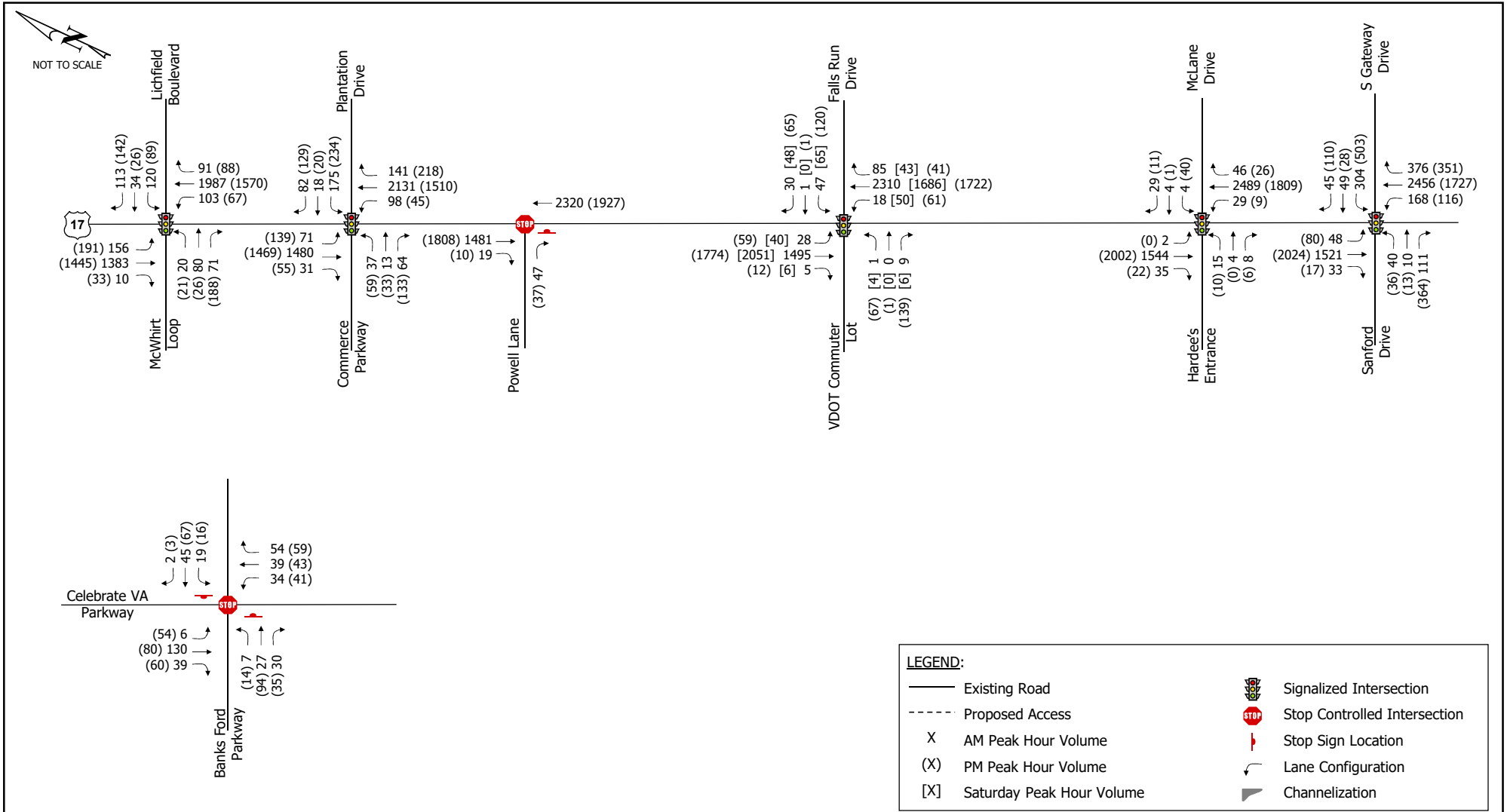
The queuing results indicate several of the mainline left turning movements along U.S. Route 17 spillback through the available storage in the AM and PM peak hours.

It should be noted that field observations and experience in the corridor indicate southbound U.S. Route 17 experiences delay and significant queuing in the PM peak hour whenever there is a slow down or incident on I-95 southbound. This delay/queue is related to the I-95 traffic and will be addressed with the I-95 Southbound Rappahannock River Crossing Mega-Project discussed above.

**Table 3-3: Intersection Level of Service, Delay, and Queue Summary
2018 Existing Conditions**

Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR				SATURDAY PEAK HOUR					
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)		
1. US Route 17 (N-S) at Sanford Drive (E) Stanstead Drive (W) Signalized	NB Left	135	57.9	E	86	70	40.8	D	125	133	Not Analyzed in this Peak Hour					
	NB Thru		27.9	C	467	494	13.8	B	163	310						
	NB Right	350	12.5	B	0	8	9.3	A	m0	6						
	NB Approach		28.5	C	--	--	14.8	B	--	--						
	SB Left	400	75.6	E	#268	258	82.6	F	#213	265						
	SB Thru		30.5	C	651	485	27.5	C	418	426						
	SB Right		17.5	B	100	90	8.1	A	14	88						
	SB Approach		31.4	C	--	--	27.3	C	--	--						
	EB Left-Thru		63.1	E	92	81	62.7	E	93	649						
	EB Right		36.1	D	10	97	49.3	D	172	437						
	EB Approach		44.5	D	--	--	51.0	D	--	--						
	WB Left	150	175.7	F	#237	617	80.1	F	#365	706						
	WB Thru		199.5	F	#290	712	53.0	D	56	619						
	WB Right	150	56.6	E	0	382	52.8	D	0	117						
	WB Approach		169.3	F	--	--	74.3	E	--	--						
Overall			41.6	D	--	--	29.7	C	--	--						
2. US Route 17 (N-S) at Hardee's Entrance (E) McLane Drive (W) Signalized	NB Left	350	79.4	E	12	10	0.0	A	0	0	Not Analyzed in this Peak Hour					
	NB Thru		7.6	A	307	296	0.8	A	20	54						
	NB Right		4.6	A	0	17	3.2	A	m0	4						
	NB Approach		7.6	A	--	--	0.8	A	--	--						
	SB Left	400	73.9	E	68	81	73.6	E	m17	37						
	SB Thru		9.2	A	667	345	2.6	A	43	209						
	SB Right		3.1	A	0	15	1.6	A	m0	--						
	SB Approach		9.8	A	--	--	2.9	A	--	--						
	EB L-T-R		74.4	E	57	78	62.3	E	0	52						
	EB Approach		74.4	E	--	--	62.3	E	--	--						
	WB L-T-R		71.2	E	48	64	66.6	E	89	104						
	WB Approach		71.2	E	--	--	66.6	E	--	--						
	Overall			9.9	A	--	--	2.9	A	--		--				
	3. US Route 17 (N-S) at VDOT Commuter Lot (E) Falls Run Drive (W) Signalized	NB Left	350	68.1	E	59	67	61.9	E	m99		107	57.8	E	43	83
		NB Thru		14.5	B	405	273	19.9	B	624		283	11.4	B	341	234
NB Right			8.9	A	0	2	10.0	A	m0	0	6.7	A	0	21		
NB Approach			15.4	B	--	--	21.2	C	--	--	12.6	B	--	--		
SB Left		400	59.2	E	21	17	41.6	D	58	55	58.4	E	73	94		
SB Thru			19.6	B	795	252	2.9	A	50	132	12.9	B	459	379		
SB Right			8.0	A	0	68	11.1	B	0	4	6.3	A	0	0		
SB Approach			19.4	B	--	--	4.4	A	--	--	13.8	B	--	--		
EB Left-Thru			63.9	E	8	7	65.6	E	126	123	59.6	E	15	34		
EB Right		200	63.6	E	0	34	61.4	E	2	117	59.2	E	0	35		
EB Approach			63.6	E	--	--	62.8	E	--	--	59.4	E	--	--		
WB Left		400	66.6	E	56	257	65.7	E	115	147	58.1	E	66	126		
WB Left-Thru			66.4	E	56	80	65.8	E	118	108	58.1	E	66	80		
WB Right		200	61.8	E	0	53	61.9	E	0	60	55.9	E	0	72		
WB Approach			64.6	E	--	--	64.4	E	--	--	57.1	E	--	--		
Overall			18.9	B	--	--	17.7	B	--	--	14.6	B	--	--		
4. US Route 17 (N-S) at Powell Lane (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour					
	NB Right		†	†	--	--	†	†	--	--						
	NB Approach		†	†	--	--	†	†	--	--						
	SB Thru		†	†	--	--	†	†	--	--						
	SB Approach		†	†	--	--	†	†	--	--						
	EB Right		9.4	A	4	66	9.5	A	3	67						
EB Approach		9.4	A	--	--	9.5	A	--	--							
5. US Route 17 (N-S) at Commerce Parkway (E) Plantation Drive (W) Signalized	NB Left	200	72.0	E	70	108	39.0	D	112	125	Not Analyzed in this Peak Hour					
	NB Thru		26.2	C	561	514	5.0	A	86	209						
	NB Right		13.2	B	0	27	7.4	A	m0	28						
	NB Approach		28.0	C	--	--	7.9	A	--	--						
	SB Left	100	80.0	E	175	282	97.4	F	m76	86						
	SB Thru		35.4	D	#991	576	7.1	A	109	283						
	SB Right		10.2	B	20	89	2.0	A	0	57						
	SB Approach		35.7	D	--	--	8.7	A	--	--						
	EB Left	420	78.3	E	66	22	64.9	E	97	32						
	EB Left-Thru		78.3	E	67	92	64.8	E	98	169						
	EB Right	200	75.3	E	0	54	62.6	E	1	101						
	EB Approach		76.6	E	--	--	63.6	E	--	--						
	WB Left	50	80.8	F	178	146	59.7	E	203	173						
	WB Thru		80.3	F	181	148	59.7	E	204	173						
	WB Right	200	68.3	E	0	78	53.9	D	0	109						
WB Approach		76.9	E	--	--	57.8	E	--	--							
Overall			36.6	D	--	--	16.1	B	--	--						
6. US Route 17 (N-S) at McWhirt Loop (E) Lichfield Road (W) Signalized	NB Left	400	81.8	F	#234	237	58.9	E	283	283	Not Analyzed in this Peak Hour					
	NB Thru		9.7	A	52	178	9.8	A	45	197						
	NB Right		15.7	B	m0	9	10.9	B	m0	13						
	NB Approach		17.0	B	--	--	15.4	B	--	--						
	SB Left	400	56.3	E	78	283	63.2	E	m58	73						
	SB Thru		50.2	D	#832	615	9.1	A	90	167						
	SB Right		17.9	B	0	53	19.8	B	m0	22						
	SB Approach		49.1	D	--	--	11.8	B	--	--						
	EB Left-Thru		60.2	E	85	88	68.4	E	171	260						
	EB Right	200	56.7	E	0	64	61.4	E	80	182						
	EB Approach		58.1	E	--	--	63.8	E	--	--						
	WB Left		82.4	F	#157	123	64.5	E	112	122						
	WB Left-Thru		83.8	F	#161	124	64.5	E	114	98						
	WB Right	100	57.1	E	0	99	61.6	E	34	127						
	WB Approach		72.1	E	--	--	62.9	E	--	--						
Overall			38.8	D	--	--	20.5	C	--	--						
7. Banks Ford Parkway (N-S) at Celebrate Parkway (E-W) Unsignalized	NB Left-Thru	400	11.0	B	7	48	13.4	B	25	57	Not Analyzed in this Peak Hour					
	NB Right		8.7	A	3	48	8.6	A	4	43						
	NB Approach		10.1	B	--	--	12.2	B	--	--						
	SB Left-Thru		12.0	B	15	39	14.5	B	23	42						
	SB Right		8.4	A	1	13	8.4	A	1	11						
	SB Approach		11.7	B	--	--	14.2	B	--	--						
	EB Left	400	7.6	A	3	21	7.5	A	3	21						
	EB Thru		†	†	--	--	†	†	--	10						
	EB Right	155	†	†	--	--	†	†	--	--						
	EB Approach		2.9	A	--	--	2.4	A	--	--						
	WB Left	325	7.3	A	0	3	7.4	A	3	8						
	WB Thru		†	†	--	--	†	†	--	--						
	WB Right	220	†	†	--	--	†	†	--	--						
	WB Approach		0.5	A	--	--	2.6	A	--	--						

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.
m - Volume for 95th percentile queue is metered by upstream signal.



Belmont Park
Existing 2018 Peak Hour Volumes
Stafford County, Virginia

Figure
3-1

4 2023 BACKGROUND CONDITIONS AND ANALYSIS

The background 2023 volumes were analyzed assuming existing intersection geometry with the addition of the southbound right turn lane conversion discussed above (as shown on Figure 4-1) in conjunction with projected background traffic volumes.

The background traffic volumes were developed based on a 2% annual growth rate and the completion of the Del Webb Development along Celebrate Virginia Parkway.

4.1 2023 BACKGROUND TRAFFIC GROWTH

The 2% annual growth rate discussed above was compounded annually for the 5-year period from 2018 to 2023 and applied to the through movements on U.S. Route 17 only. The resulting 2023 existing + growth volumes are shown on Figure 4-2.

4.2 DEL WEBB TRIP GENERATION AND ASSIGNMENT

The Del Webb development is currently under construction with approximately 335 age restricted units remaining to be built at the time of the counts. As directed in the scoping agreement, the trips that would be generated by the remaining units were estimated based on driveway counts (completed by Bowman Consulting for the Canon Ridge scoping documents) and not ITE Trip Generation Rates.

The resulting trips generated by the remaining Del Webb units are shown in Table 4-1.

Table 4-1: Del Webb Trip Generation

Buildout				Weekday						
Land Use	Size	Units	Land Use Code	AM Peak Hour			PM Peak Hour			Average Daily Trips
				In	Out	Total	In	Out	Total	
1. Del Webb										
<u>Residential</u>										
Age Restricted ⁽¹⁾	335	D.U.	N/A	28	52	80	61	50	111	1,110
Total Del Webb Trips				28	52	80	61	50	111	1,110

Notes: (1) Per the scoping agreement, Del Webb trip rate based on driveway counts as reported by the Canon Ridge Scoping Documents (Bowman Consulting). The AM rate is 0.24/unit and the PM is 0.33/unit. No ADT rate was provided; it was therefore assumed as 1.10 of the PM count. In/Out distributions follow ITE distributions for LU Code 252 (Senior Adult - Attached).

The trips generated by the remaining Del Webb development were assigned to the local roadway network based on the residential site trip distributions described below. The resulting Del Webb development trips are shown on Figure 4-3.

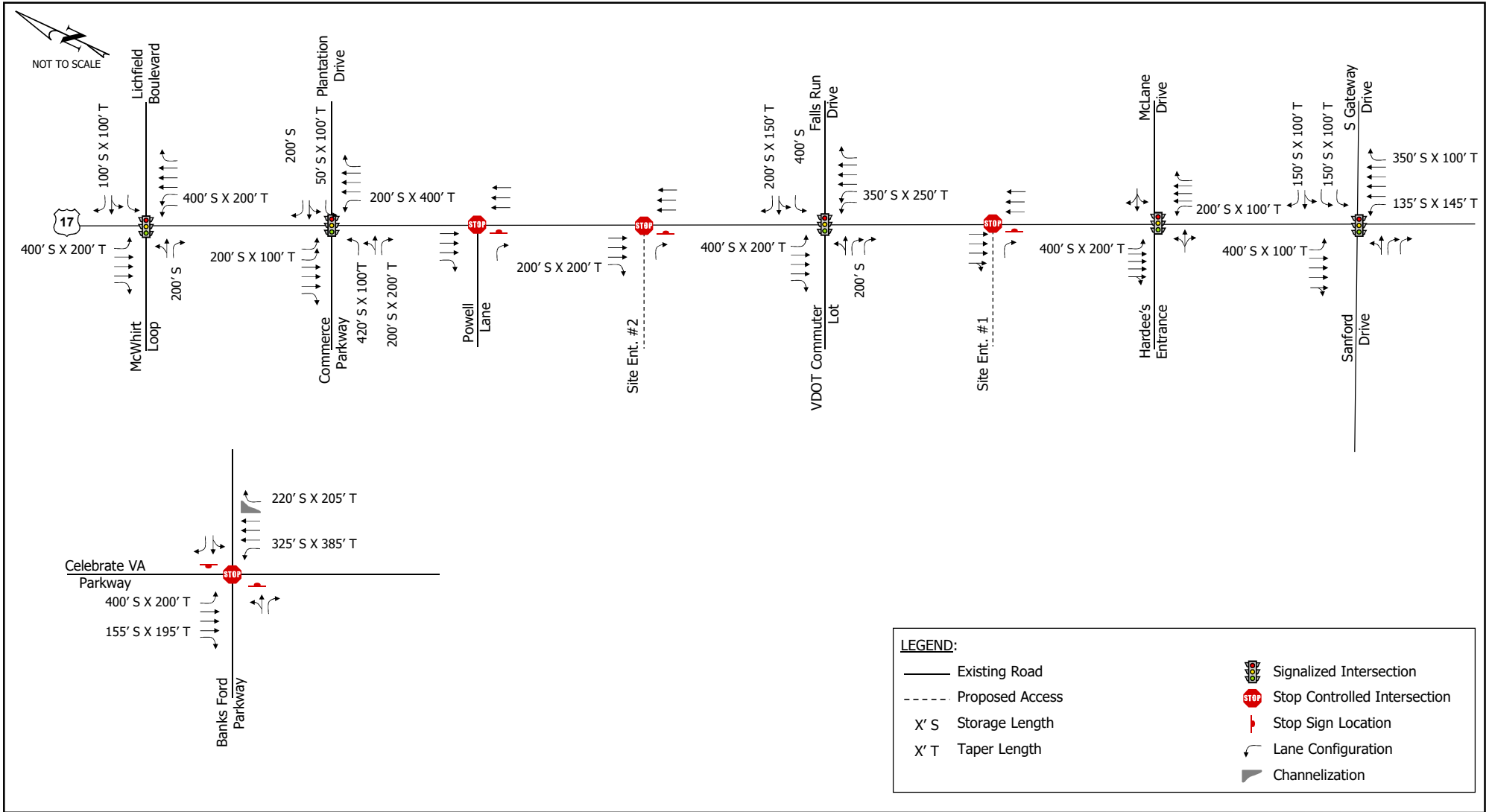
4.3 2023 BACKGROUND TRAFFIC FORECASTS

The Del Webb development trips shown on Figure 4-3 were then added to the 2023 Existing + Growth volumes shown on Figure 4-2 to yield the total 2023 Background Traffic Forecasts which are shown on Figure 4-4.

4.4 2023 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

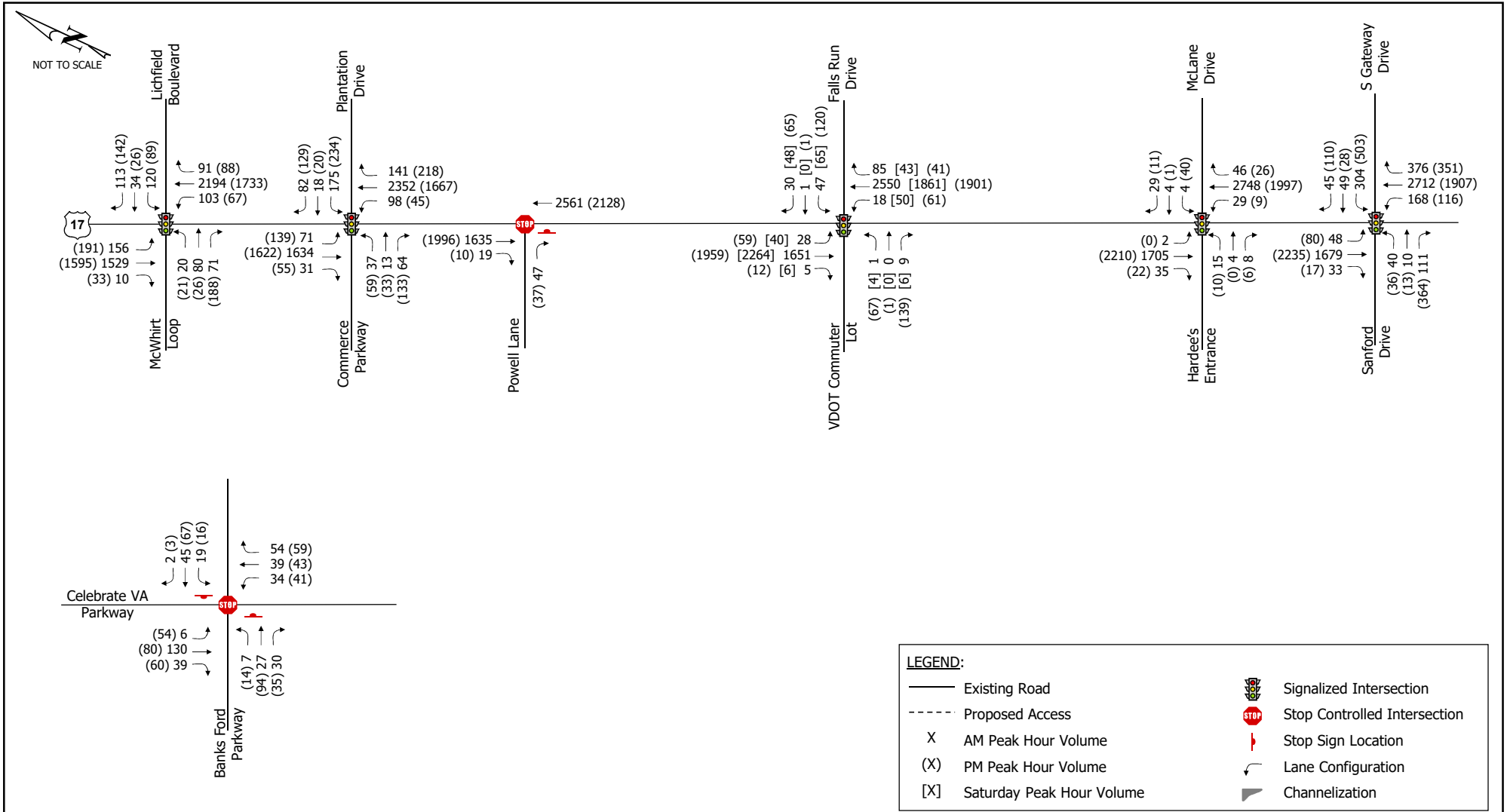
Table 4-2 summarizes the 2023 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2023 background peak hour traffic volumes shown on Figure 4-4, the future lane geometry shown on Figure 4-1, and the existing traffic signal timings. The corresponding SYNCHRO worksheets are included in Appendix D.

As indicated in Table 4-2, under 2023 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic but no new movements would spill back through the available storage.



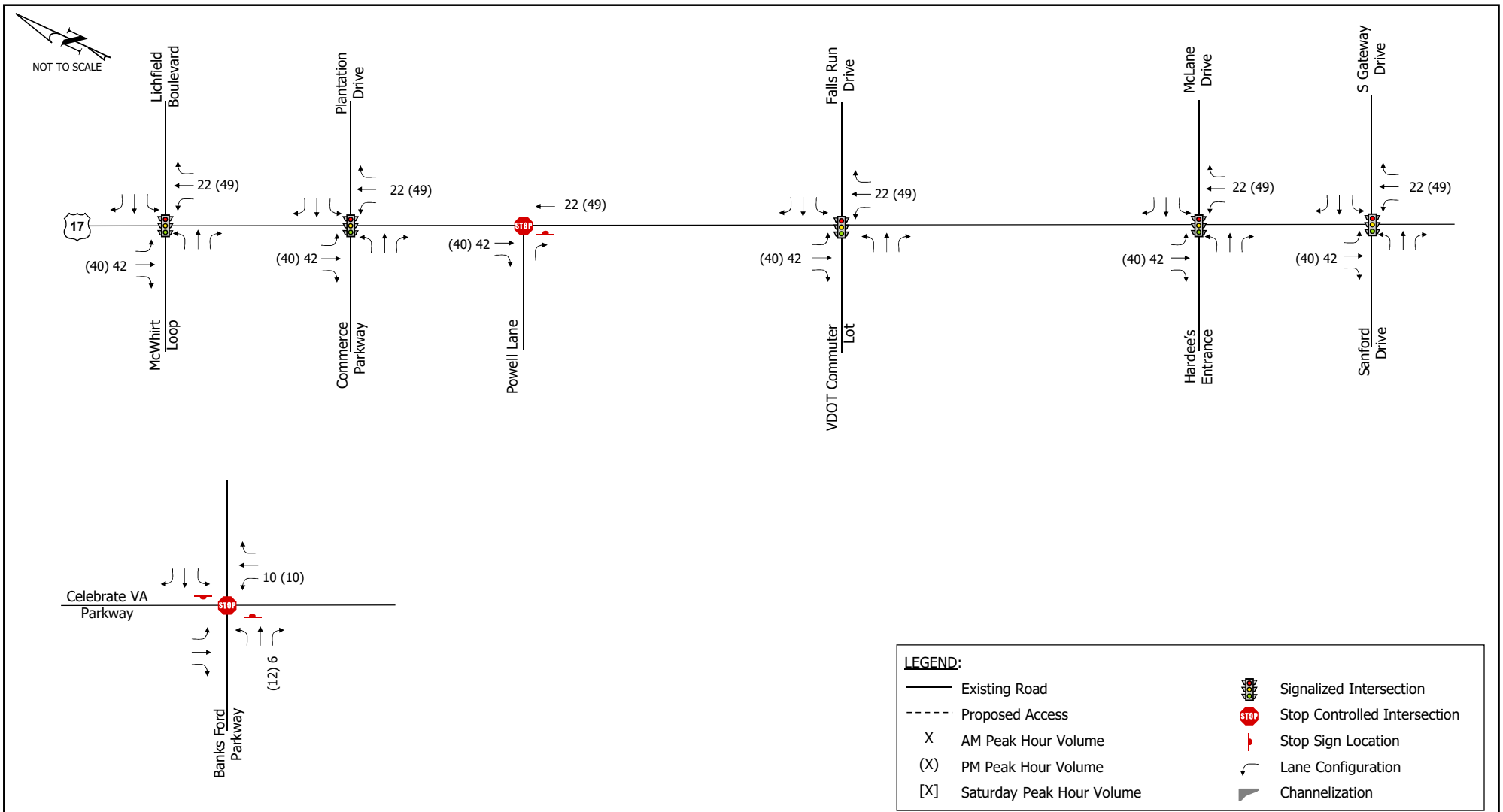
Belmont Park
 Future 2023 Lane Use and Traffic Control
 Stafford County, Virginia

Figure
 4-1



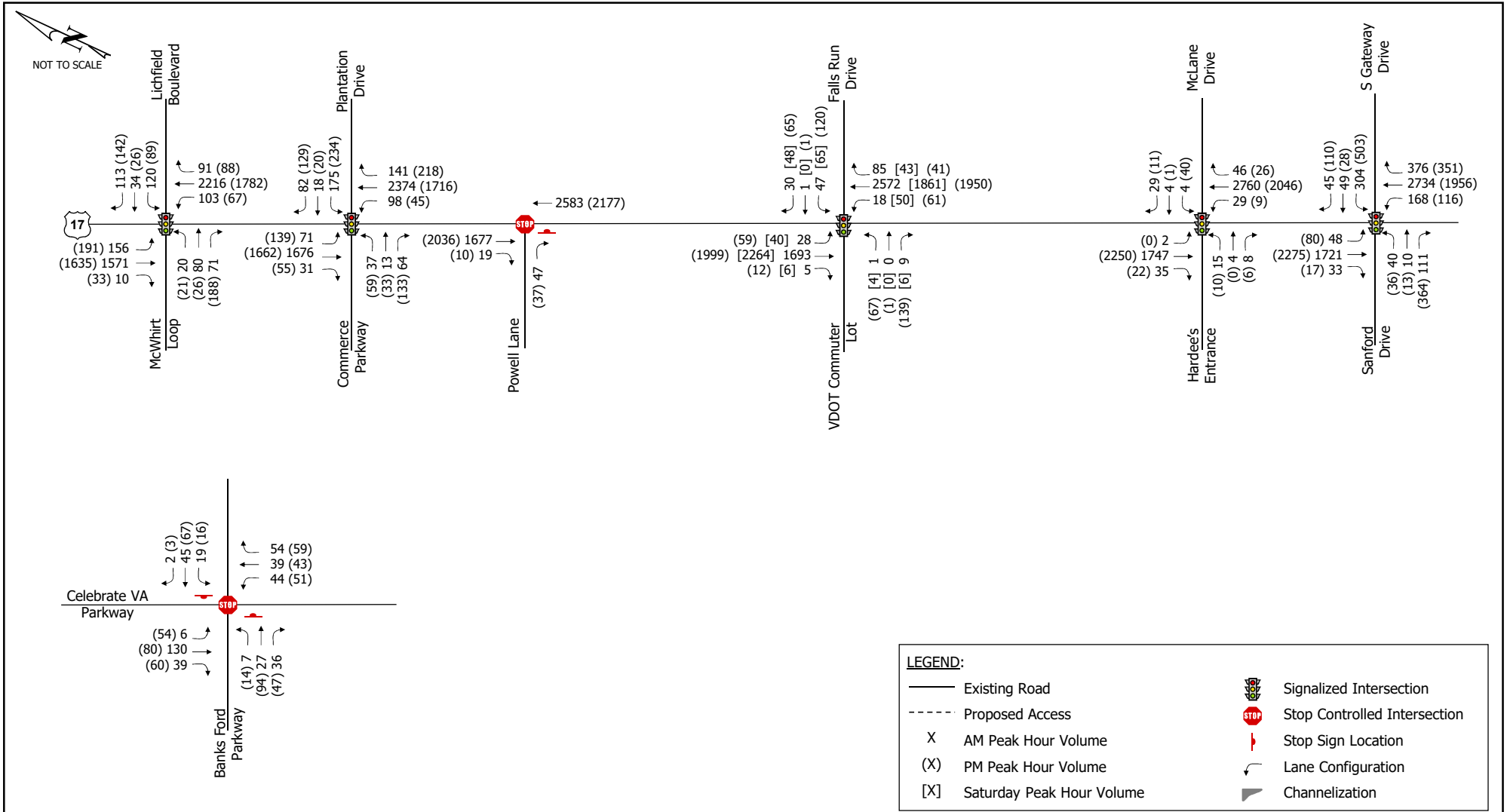
Belmont Park
Existing + Growth 2023 Peak Hour Volumes
Stafford County, Virginia

Figure
4-2



Belmont Park
Del Webb Development Trips
Stafford County, Virginia

Figure
4-3



Belmont Park
Total Background 2023 Peak Hour Volumes
Stafford County, Virginia

Figure
4-4

5 SITE TRIP GENERATION AND DISTRIBUTION

Site traffic for the proposed development was estimated based on the site characteristics and subsequently distributed to the surrounding roadway network.

The Applicant is seeking to rezone the approximately 157 acres site from agricultural (A-1) and residential (R-1) to mixed-use (MU). The proposed development will be built in two (2) phases with Phase 1 encompassing the northern portion of the site (closer to US Route 17) and Phase 2 including the Southern portion of the site (closer to Celebrate Virginia Parkway). See Figure 1-2 for the Generalized Development Plan. For purposes of this study, the development was assumed to include:

Phase 1:

- 435,400 S.F. of Retail Space;
- 162,500 S.F. of Office Space; and
- and 303 Multi-family Apartments.

Phase 2:

- 214 Age Restricted Townhomes;
- 198 Age Restricted Apartments; and
- A 100 bed Assisted Living Facility.

The project includes relocating the existing VDOT Park and Ride lot to the east with the current entrance roadway serving both the project and the Park and Ride lot. Access to the development will be provided via four (4) entrances.

1. A full movement entrance on US Route 17 at the existing signalized intersection of US Route 17/Falls Run Drive/VDOT Commuter Lot;
2. A right-in/right-out only entrance west of the US Route 17/Falls Run Drive/VDOT Commuter Lot intersection;
3. A right-in/right-out only entrance east of the US Route 17/Falls Run Drive/VDOT Commuter Lot intersection; and
4. A partial access (right-in/right-out/left-in) entrance on Celebrate Virginia Parkway.

The US Route 17 entrances would be constructed with Phase 1 and the Celebrate Virginia Parkway entrance constructed with Phase 2. For purposes of this analysis, Phase 1 of the development was assumed to be complete in 2023 and Phase 2 in 2028.

5.1 OVERALL TRIP GENERATION

The site-generated traffic volumes shown in Table 5-1 was estimated using the 10th edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* and were calculated using the size of the development as the independent variable.

Table 5-1: Overall Trip Generation Summary

Buildout Land Use	Size	Units	Land Use Code	Weekday									Saturday Midday Peak Hour		
				AM Peak Hour			PM Peak Hour			Average Daily Trips	In	Out	Total		
				In	Out	Total	In	Out	Total						
1. ITE Trip Generation⁽¹⁾															
Residential															
Phase 1															
Multifamily Housing (Mid-Rise)	303	D.U.	221	26	75	101	78	50	128	1,650	65	68	133		
Phase 2⁽²⁾															
Senior Adult Housing - Townhomes	214	D.U.	252	15	28	43	30	24	54	835	44	27	71		
Senior Adult Housing - Apartments	198	D.U.	252	14	25	39	28	22	50	771	40	25	65		
Assisted Living	100	Beds	254	12	7	19	10	16	26	260	12	15	27		
Residential Subtotal				67	135	202	146	112	258	3,516	161	135	296		
Commercial															
Office	162,250	S.F.	710	154	25	179	29	151	180	1,697	46	40	86		
Shopping Center	435,400	S.F.	820	229	140	369	775	839	1,614	16,348	1,029	950	1,979		
Commercial Subtotal				383	165	548	804	990	1,794	18,045	1,075	990	2,065		
Total ITE Generated Trips (Residential + Commercial)				450	300	750	950	1,102	2,052	21,561	1,236	1,125	2,361		
2. Internal Trip Reduction (Residential and Commercial Only - Does Not Include VDOT Commuter Lot)															
Internal Trip Reduction - ITE Method ⁽³⁾															
Calculated Internal Capture - See Appendix						-4.9%			-15.6%	-15.6%			-15.6%		
Total Internal Trips				(22)	(15)	(37)	(148)	(172)	(320)	(3,362)	(193)	(175)	(368)		
3. External Trips (ITE Generated Trips - Internal Trip Reduction)⁽⁴⁾															
Residential				64	128	192	123	95	218	2,968	136	114	250		
Office				147	24	171	24	127	151	1,432	39	34	73		
Retail				218	133	351	654	708	1,362	13,800	868	802	1,670		
Total External Trips (Residential + Commercial Only)				429	285	714	801	930	1,731	18,200	1,043	950	1,993		
4. VDOT Commuter Lot to Retail Capture															
Commuter Lot Internal Trip Reduction ⁽⁵⁾						-10.0%			-10.0%	-10.0%	-	-	-		
Calculated Retail Capture				(22)	(13)	(35)	(65)	(71)	(136)	(1,380)	-	-	-		
Total External Retail Trips⁽⁶⁾				196	120	316	589	637	1,226	12,420	868	802	1,670		
5. Pass-By/Diverted Link Trip Reduction⁽⁷⁾															
External Retail Trips				196	120	316	589	637	1,226	12,420	868	802	1,670		
Pass-by Trips				(67)	(67)	(134)	(217)	(217)	(434)	(4,223)	(295)	(273)	(568)		
Total Primary External Shopping Center Trips				129	53	182	372	420	792	8,197	573	529	1,102		
Total ITE Site Trips Generated				450	300	750	950	1,102	2,052	21,561	1,236	1,125	2,361		
Total Internal Trips (ITE Internal + Commuter Lot Internal)				(44)	(28)	(72)	(213)	(243)	(456)	(4,742)	(193)	(175)	(368)		
Total Pass-By Trips				(67)	(67)	(134)	(217)	(217)	(434)	(4,223)	(295)	(273)	(568)		
Total External Primary Trips				339	205	544	520	642	1,162	12,596	748	677	1,425		

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 10th Edition. Assumes General Urban/Suburban land use category.

(2) Assumes all Phase 2 residential buildout is age-restricted.

(3) Per Chapter 527 guidelines (page 62), internal trip reductions are calculated using ITE-based methodologies with VDOT capture rates.

ADT and Saturday reduction is the PM reduction as ITE does not have internal capture data for ADT or Saturday.

All reductions are the smaller of trips generated by the two land uses.

(4) External trips are ITE trips minus pro rated internal trips based on total internal trips and specific land use ITE trips.

For Example: Inbound AM Residential Trips

Total Internal Trips: 22

Total External ITE Trips: 450

Total Residential ITE Trips: 67

Residential Portion: $67/450 = 0.149$

Residential Internal Trips: $22 * 0.149 = 3$

Residential External Trips = ITE Residential Trips - Internal Portion: $67 - 3 = 64$

(5) Internal reduction for VDOT commuter lot to retail assumed to be similar to retail to residential reductions. Based on ITE data, this was assumed at 10% and applies to the retail trips only. No commuter lot internal reduction taken in the Saturday peak hour.

(6) Total External Retail Trips calculated as sum of External Retail (#3) and Commuter Lot Capture (#4).

For Example: Outbound PM External Retail Trips = 708 (External Retail) + -71 (Commuter Lot Capture) = 637

(7) Pass-by reduction percentage from ITE data per Chapter 527 guidelines and applied to Shopping Center trips only.

5.1.1 INTERNAL TRIPS

Internal trips are trips that would make a stop at more than one of the uses within a development. For example, a customer may visit more than one retail store within the development during the same trip. Typically, internal trips are reduced from the overall trip generation of the development and do not appear on any of the external study intersections.

In accordance with 527 guidelines and as agreed upon in the scoping agreement, the ITE method was applied to calculate the internal reduction. The calculations are included in Appendix E and indicate the proposed development will experience an 4.9% internal capture in the AM peak hour and a 15.6% internal capture in the PM peak hour. Since ITE has no data on daily or Saturday internal capture rates, it was assumed that based on the nature of the uses (i.e. retail use patterns), the daily and Saturday internal capture would follow the PM peak hour.

5.1.1 VDOT COMMUTER LOT CAPTURE

Based on the nature of the proposed retail uses, it is reasonable to assume some internal capture between the vehicles utilizing the Commuter Lot and the retail uses. Therefore, in accordance with the scoping agreement, a 10% capture was applied to the retail trips to account for the interaction with the Commuter Lot.

5.1.2 PASS-BY TRIPS

Pass-by trips are trips that would be drawn to the development from the existing traffic stream on the adjacent streets. These trips are intermediate stops on the route from an origin to the primary destination (i.e. stopping for gas on the route from home to work). These trips will not add to the overall traffic volumes on the roadway, but will add to the turning traffic at the site access locations.

In accordance with Chapter 527 guidelines and as agreed upon in the scoping agreement, a 34% reduction was applied to the overall trip generation to account for pass-by trips.

5.1.3 PRIMARY TRIPS

As indicated above, not all trips will be considered new trips to the roadway network. New trips, or trips made for the specific purpose of visiting the development, are referred to as primary trips and are applied to all study intersections.

As shown in Table 5-1, with the internal and pass-by reductions, the proposed development will generate a total of 544 primary AM peak hour trips (339 in and 205 out), 1,162 primary PM peak hour trips (520 in and 642 out), 1,425 primary Saturday peak hour trips (748 in and 677 out), and 12,596 primary average weekday daily trips.

5.2 PHASE 1 TRIP GENERATION

As detailed above, the proposed development is anticipated to be built in two separate phases with Phase 1 completed in 2023 and Phase 2 in 2028. The trips that would be generated by the overall development (shown in Table 5-1) were then assigned to each phase as shown in Table 5-2.

Table 5-2: Trip Generation by Phase

Buildout Land Use	Weekday						Average Daily Trips	Saturday		
	AM Peak Hour			PM Peak Hour				Midday Peak Hour		
	In	Out	Total	In	Out	Total		In	Out	Total
Phase 1 Trip Summary⁽¹⁾										
<u>Residential Trips</u>										
External Primary Trips	25	71	96	66	42	108	1,393	55	57	112
<u>Commercial</u>										
Office + Retail External Primary Trips	276	77	353	396	547	943	9,629	612	563	1,175
Retail Pass-By Trips	67	67	134	217	217	434	4,223	295	273	568
Total Phase 1 External Primary Trips	301	148	449	462	589	1,051	11,022	667	620	1,287
Phase 2 Trip Summary⁽¹⁾										
<u>Residential Trips</u>										
External Trips	39	57	96	57	53	110	1,575	81	57	138
Total Phase 2 External Trips	39	57	96	57	53	110	1,575	81	57	138

Note: (1) See overall trip generation (Table 5-1) for calculations.

As shown on Table 5-2, Phase 1 will generate a total of 449 AM peak hour primary trips (301 in and 148 out), 1,051 PM peak hour primary trips (462 in and 589 out), 1,287 Saturday peak hour primary trips (667 in and 620 out), and 11,022 daily primary trips.

5.3 PRIMARY TRIP DISTRIBUTIONS

The distribution of primary trips generated by the development was based on the existing travel patterns, the nature of the uses (commercial/residential, and local knowledge.

5.3.1 COMMERCIAL DISTRIBUTIONS

The following directional distributions were assumed for the primary commercial trips:

- To/From the North on U.S Route 17 – 40%
- To/From the South on U.S. Route 17 – 50%
- To/From the South on Celebrate Virginia Parkway – 5%
- To/From the North on Plantation Drive – 5%

The commercial directional distributions were then applied to the study intersections and site entrances as shown on Figure 5-1.

5.3.2 RESIDENTIAL DISTRIBUTIONS

The following directional distributions were assumed for the primary residential trips:

- To/From the North on U.S Route 17 – 20%
- To/From the South on U.S. Route 17 – 80%

The residential directional distributions were then applied to the study intersections and site entrances as shown on Figure 5-2.

5.4 PRIMARY SITE TRIP ASSIGNMENT

The trip distribution percentages for the primary trips were applied to the Phase 1 trip generation shown in Table 5-2 to distribute the primary trips to the surrounding roadway network. The resulting site generated primary trips are shown in Figure 5-3 (commercial) and Figure 5-4 (residential).

5.5 PASS-BY TRIP DISTRIBUTIONS

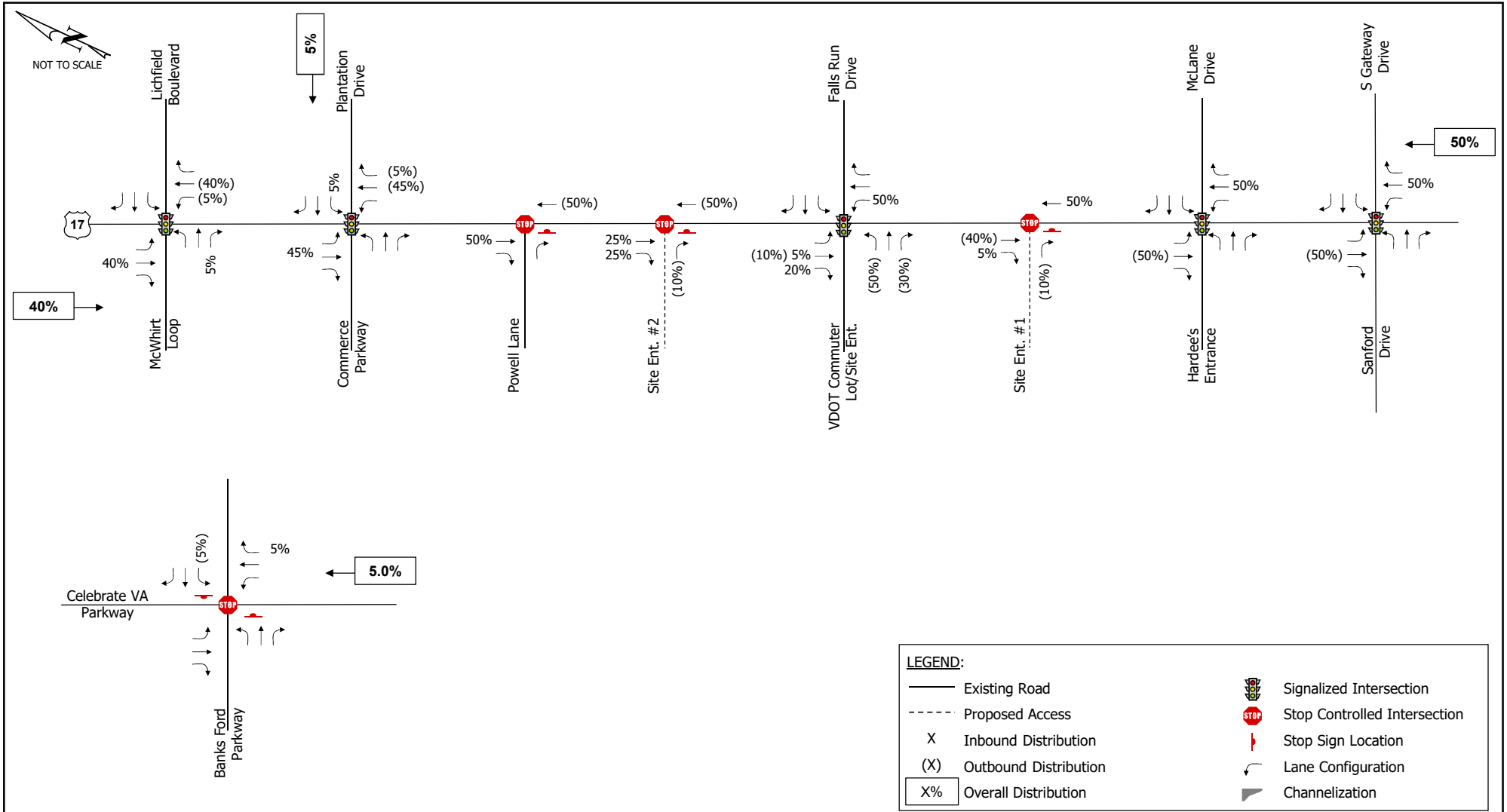
Since pass-by trips by nature come from the existing traffic stream, it was assumed that all pass-by trips originated as through traffic on U.S. Route 17. The distribution of the pass-by trips was based on the existing directional split on U.S. Route 17 during the peak hours and was assumed as follows:

- AM Peak Hour (60% from the south/40% from the north)
- PM Peak Hour (50% from the south/50% from the north)
- Saturday Peak Hour (50% from the south/50% from the north)

The trip distribution percentages for the pass-by trips were applied to the trip generation shown in Table 5-2 to distribute the pass-by trips to the surrounding roadway network. The resulting site generated pass-by trips are shown in Figure 5-5.

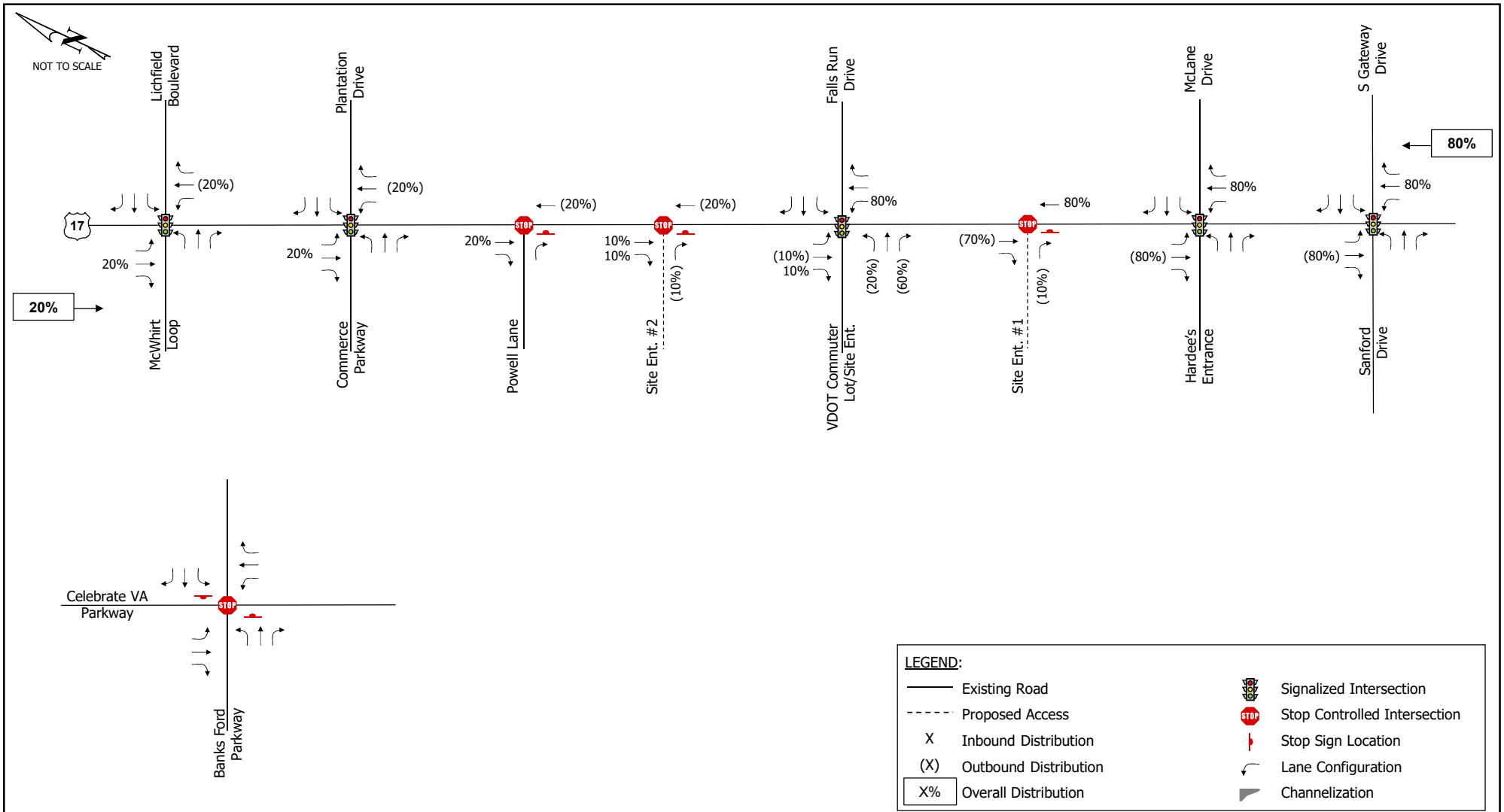
5.6 TOTAL SITE TRIPS

The pass-by trips shown on Figure 5-5 were then added to the primary trips shown on Figure 5-3 and 5-4 and the resulting total site trips for Phase 1 are shown in Figure 5-6.



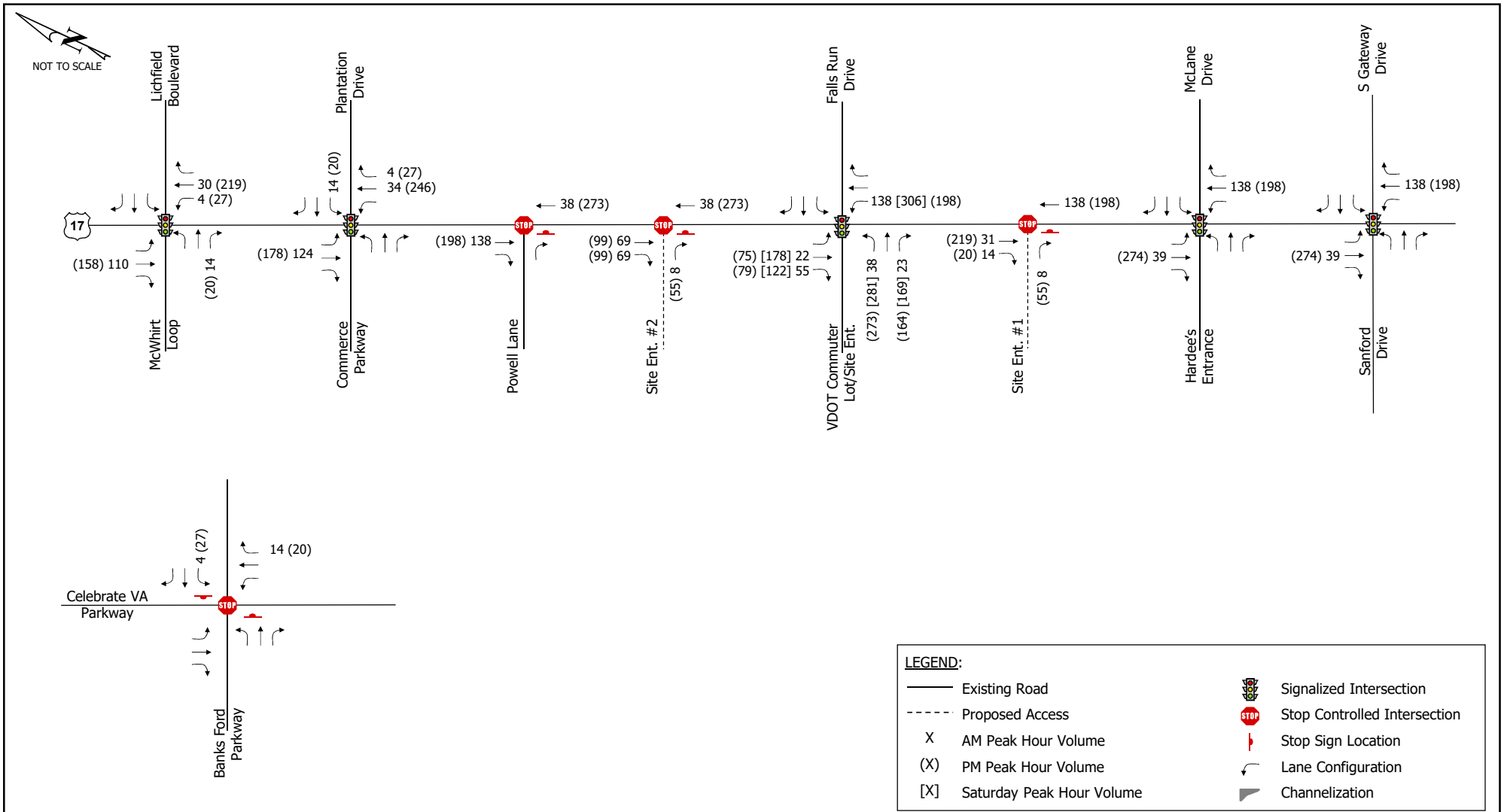
Belmont Park
 Phase 1 External Site Trip Distributions – Commercial
 Stafford County, Virginia

Figure
 5-1



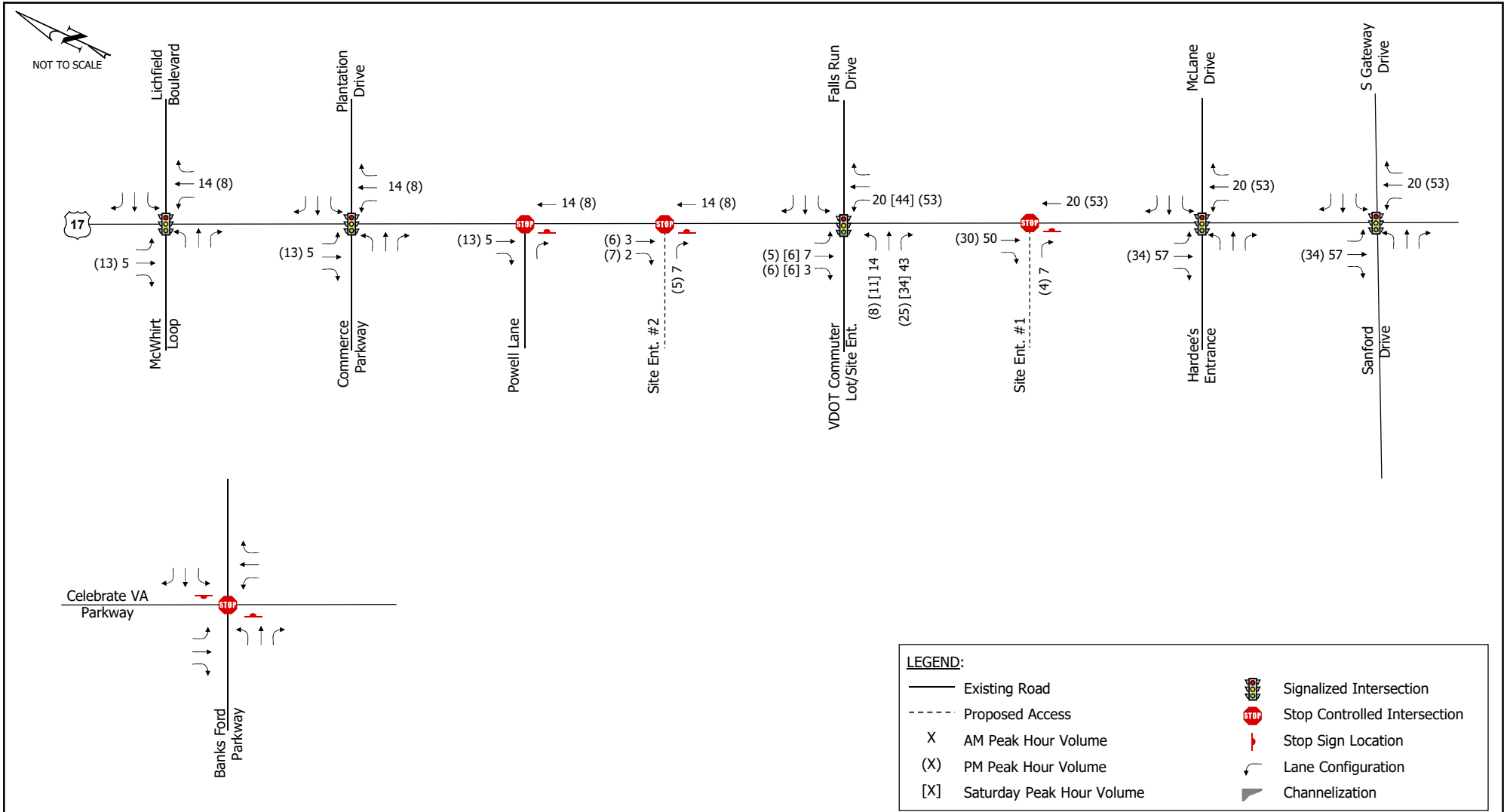
Belmont Park
 Phase 1 External Site Trip Distributions – Residential
 Stafford County, Virginia

Figure
 5-2



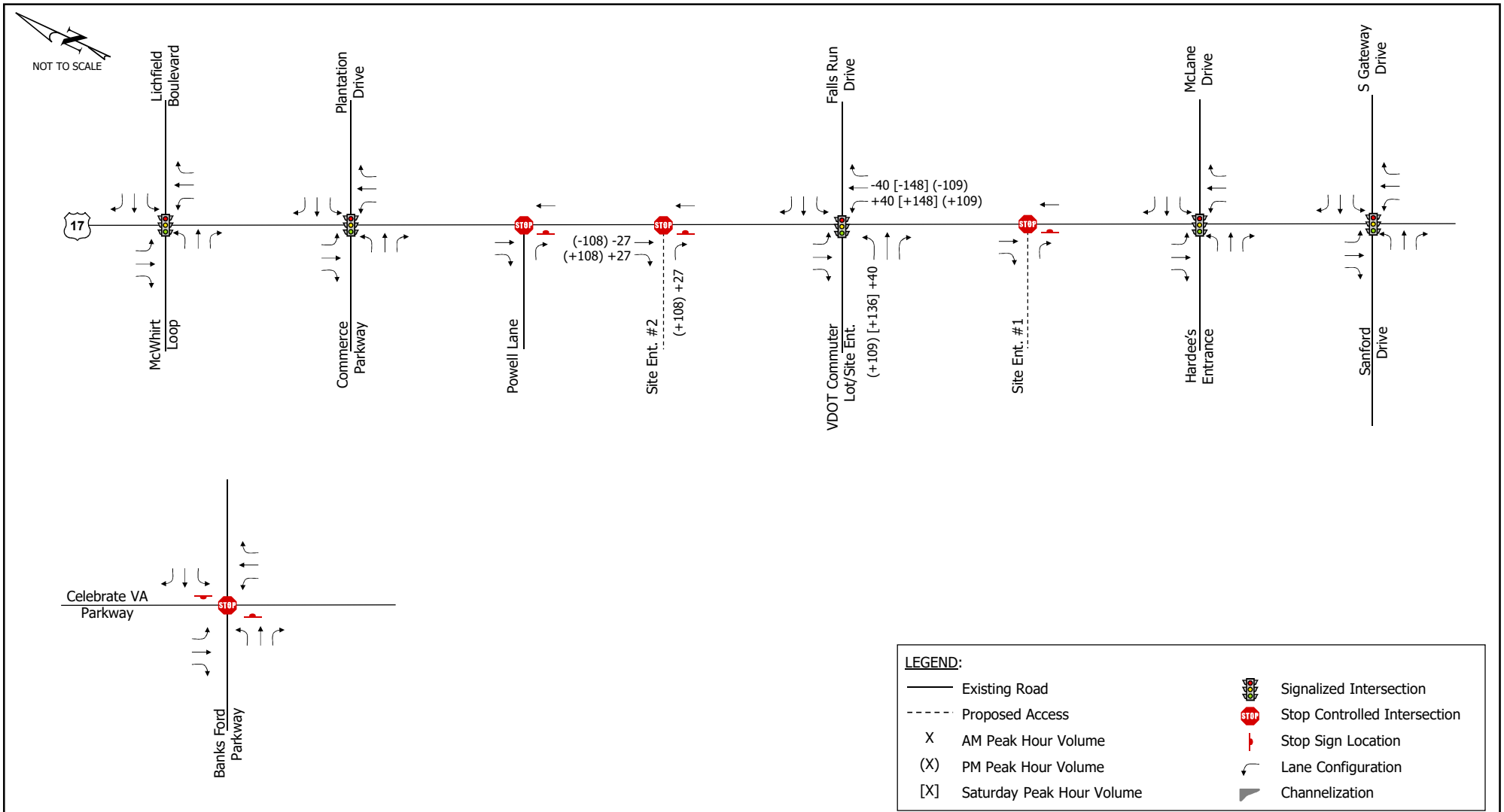
Belmont Park
 Phase 1 External Primary Site Trips – Commercial
 Stafford County, Virginia

Figure
 5-3



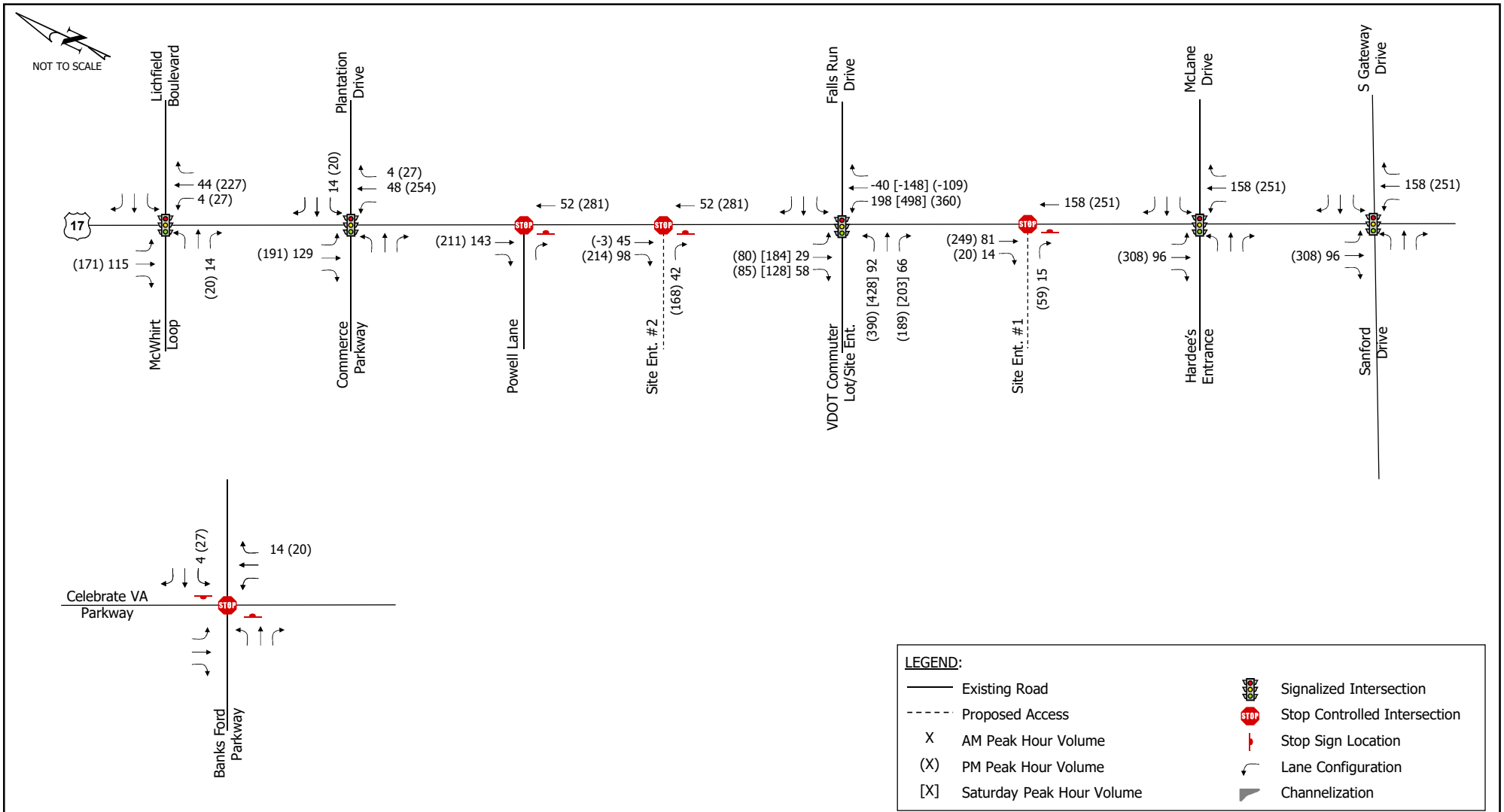
Belmont Park
 Phase 1 External Primary Site Trips – Residential
 Stafford County, Virginia

Figure
 5-4



Belmont Park
Phase 1 Retail Pass-By Trips
Stafford County, Virginia

Figure
5-5



Belmont Park
Phase 1 Total External Site Trips
Stafford County, Virginia

Figure
5-6

6 ANALYSIS OF 2023 CONDITIONS WITH DEVELOPMENT

To complete the analysis of the 2023 total conditions (with Phase 1 of the proposed development), the estimated site trips were added to the background 2023 volumes. The projected volumes were then used to complete the capacity analysis.

6.1 2023 TOTAL TRAFFIC VOLUMES

To generate the 2023 total future traffic volumes, the total site trips shown on Figure 5-6 were added to the background 2023 traffic volumes shown on Figure 4-4. The resulting future volumes are shown in Figure 6-1.

6.2 CAPACITY ANALYSES

Table 6-1 summarizes the 2023 total future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2023 future peak hour traffic volumes shown on Figure 6-1, the future lane geometry (Figure 4-1), and optimized signal timings. The corresponding SYNCHRO worksheets are included in Appendix F.

As indicated in Table 6-1, under 2023 future conditions, the majority of the study intersections would operate at comparable LOS and queuing to background conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.

The U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection would degrade from an overall LOS C/B/B (AM/PM/Sat peak hours) under background conditions to an overall LOS B/E/F (AM/PM/Sat peak hours). The northbound left turn from U.S. Route 17 into the site will operate at an overall LOS F with queues that extend beyond the available storage.

All other site entrances operate at LOS C or better in all peak hours.

It should be noted that an overall optimization of the signal timings throughout the corridor may help alleviate some of the delay/queue.

**Table 6-1: Intersection Level of Service, Delay, and Queue Summary
2023 Total Future Conditions**

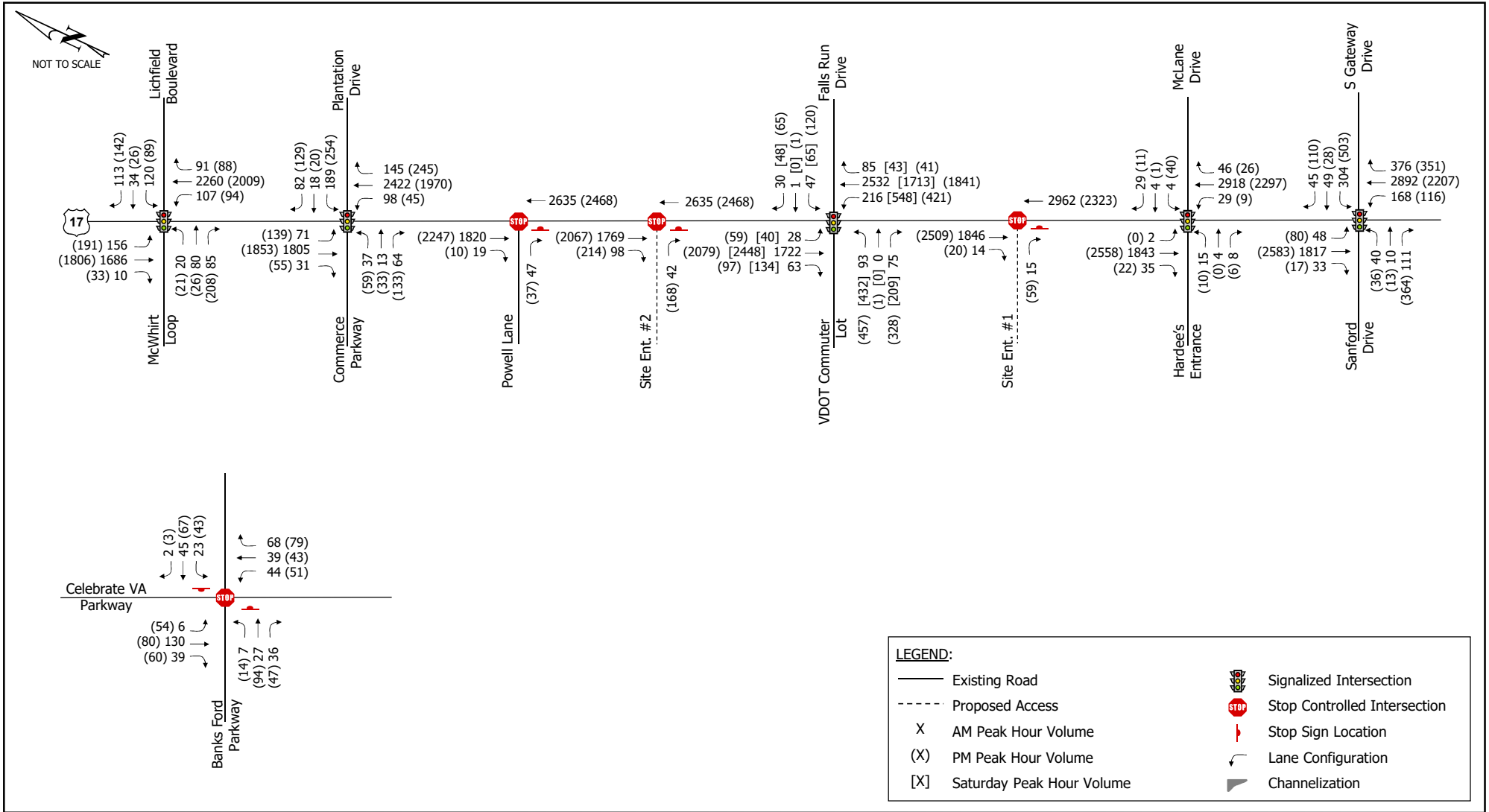
Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR				SATURDAY PEAK HOUR			
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)
1. US Route 17 (N-S) at Sanford Drive (E) Stanstead Drive (W) Signalized	NB Left	135	73.3	E	254	245	77.5	E	m#191	245	Not Analyzed in this Peak Hour			
	NB Thru		29.1	C	818	548	26.0	C	504	539				
	NB Right	350	14.8	B	109	349	3.2	A	11	146				
	NB Approach		29.7	C	--	--	25.3	C	--	--				
	SB Left	400	79.7	E	#114	113	40.0	D	130	252				
	SB Thru-Right		4.3	A	72	372	9.2	A	167	291				
	SB Approach		6.2	A	--	--	10.1	B	--	--				
	EB Left-Thru		86.3	F	#120	110	69.0	E	97	698				
	EB Right		43.3	D	17	149	52.4	D	176	375				
	EB Approach		56.6	E	--	--	54.4	D	--	--				
	WB Left	150	85.5	F	#203	310	67.6	E	324	483				
	WB Thru		97.7	F	#259	523	50.8	D	54	85				
	WB Right	150	61.9	E	0	265	50.7	D	0	150				
WB Approach		86.5	F	--	--	63.9	E	--	--					
Overall			26.7	C	--	--	24.7	C	--	--				
2. US Route 17 (N-S) at Hardee's Entrance (E) McLane Drive (W) Signalized	NB Left	350	89.9	F	m39	111	52.7	D	m13	128	Not Analyzed in this Peak Hour			
	NB Thru		16.9	B	204	830	5.1	A	123	802				
	NB Right		3.1	A	m0	18	1.5	A	m0	258				
	NB Approach		17.5	B	--	--	5.3	A	--	--				
	SB Left	400	90.3	F	m3	22	0.0	A	m54	0				
	SB Thru-Right		0.6	A	12	145	1.0	A	0	127				
	SB Approach		0.7	A	--	--	1.0	A	--	--				
	EB L-T-R		72.5	E	54	93	63.0	E	0	60				
	EB Approach		72.5	E	--	--	63.0	E	--	--				
	WB L-T-R		69.7	E	48	75	67.7	E	91	122				
	WB Approach		69.7	E	--	--	67.7	E	--	--				
	Overall			11.7	B	--	--	3.9	A	--		--		
	3. US Route 17 (N-S) at VDOT Commuter Lot (E) Falls Run Drive (W) Signalized	NB Left	350	46.3	D	m141	144	87.3	F	#370		494	Not Analyzed in this Peak Hour	
NB Thru			9.0	A	535	306	18.6	B	292	555				
NB Right			8.9	A	m0	59	18.0	B	m0	234				
NB Approach			11.9	B	--	--	31.2	C	--	--				
SB Left		400	102.4	F	m37	83	76.9	E	m90	400				
SB Thru			16.5	B	683	328	80.6	F	#979	711				
SB Right			14.6	B	m1	32	63.9	E	m8	375				
SB Approach			17.7	B	--	--	79.7	E	--	--				
EB Left-Thru			98.0	F	#201	201	133.3	F	#776	705				
EB Right		200	64.7	E	0	98	44.6	D	93	695				
EB Approach			83.1	F	--	--	96.3	F	--	--				
WB Left		400	91.6	F	#69	195	74.9	E	#126	198				
WB Left-Thru			91.6	F	#69	98	76.2	E	#132	177				
WB Right	200	71.3	E	0	60	65.6	E	0	93					
WB Approach		83.7	F	--	--	72.1	E	--	--					
Overall			17.6	B	--	--	61.5	E	--	--				
4. US Route 17 (N-S) at Powell Lane (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour			
	NB Right		†	†	--	--	†	†	--	--				
	NB Approach		†	†	--	--	†	†	--	--				
	SB Thru		†	†	--	--	†	†	--	--				
	SB Approach		†	†	--	--	†	†	--	--				
	EB Right		10.5	B	6	96	10.0	A	4	75				
EB Approach		10.5	B	--	--	10.0	A	--	--					
5. US Route 17 (N-S) at Commerce Parkway (E) Plantation Drive (W) Signalized	NB Left	200	70.2	E	m104	262	83.4	F	m54	136	Not Analyzed in this Peak Hour			
	NB Thru		16.8	B	#1109	496	16.1	B	m566	376				
	NB Right		4.9	A	m13	54	4.8	A	m5	56				
	NB Approach		18.1	B	--	--	16.2	B	--	--				
	SB Left	100	64.0	E	m57	95	42.7	D	111	145				
	SB Thru		19.4	B	#804	306	4.5	A	78	214				
	SB Right		15.9	B	m0	30	6.3	A	m0	34				
	SB Approach		21.0	C	--	--	7.1	A	--	--				
	EB Left	420	70.0	E	61	29	66.8	E	96	81				
	EB Left-Thru		70.1	E	63	114	66.8	E	100	250				
	EB Right	200	67.6	E	0	63	64.1	E	0	167				
	EB Approach		68.7	E	--	--	65.2	E	--	--				
	WB Left	50	71.9	E	174	160	65.2	E	226	209				
WB Thru		70.6	E	172	164	64.7	E	226	208					
WB Right	200	60.6	E	0	122	55.8	E	0	165					
WB Approach		68.2	E	--	--	62.0	E	--	--					
Overall			23.3	C	--	--	18.4	B	--	--				
6. US Route 17 (N-S) at McWhirt Loop (E) Lichfield Road (W) Signalized	NB Left	400	40.6	D	m57	138	62.4	E	m70	110	Not Analyzed in this Peak Hour			
	NB Thru		12.2	B	m#79	232	8.9	A	101	192				
	NB Right		15.6	B	m0	30	15.7	B	m0	36				
	NB Approach		13.5	B	--	--	11.5	B	--	--				
	SB Left	400	115.8	F	#319	350	68.7	E	#298	311				
	SB Thru		22.7	C	486	494	11.8	B	75	282				
	SB Right		12.9	B	0	19	9.2	A	m0	23				
	SB Approach		30.5	C	--	--	17.1	B	--	--				
	EB Left-Thru		121.8	F	#230	221	64.2	E	92	155				
	EB Right	200	65.8	E	0	154	64.1	E	110	192				
	EB Approach		96.2	F	--	--	64.1	E	--	--				
	WB Left		129.7	F	#198	161	67.1	E	114	153				
	WB Left-Thru		123.6	F	#201	160	67.2	E	116	138				
WB Right	100	67.4	E	0	148	63.5	E	35	175					
WB Approach		101.5	F	--	--	65.1	E	--	--					
Overall			28.3	C	--	--	19.7	B	--	--				
7. Banks Ford Parkway (N-S) at Celebrate Parkway (E-W) Unsignalized	NB Left-Thru	400	10.7	B	5	57	13.2	B	21	70	Not Analyzed in this Peak Hour			
	NB Right		8.7	A	3	57	8.6	A	4	49				
	NB Approach		9.7	A	--	--	11.8	B	--	--				
	SB Left-Thru		11.4	B	11	53	15.3	C	27	68				
	SB Right		8.4	A	0	23	8.4	A	0	20				
	SB Approach		11.3	B	--	--	15.1	C	--	--				
	EB Left	400	7.5	A	3	37	7.5	A	3	37				
	EB Thru		†	†	--	--	†	†	--	--				
	EB Right	155	†	†	--	--	†	†	--	--				
	EB Approach		2.7	A	--	--	2.7	A	--	--				
	WB Left	325	7.3	A	0	3	7.4	A	3	21				
	WB Thru		†	†	--	--	†	†	--	--				
	WB Right	220	†	†	--	--	†	†	--	--				
WB Approach		0.5	A	--	--	3.0	A	--	--					
8. US Route 17 (N-S) at Site Ent. #1 (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour			
	NB Right		0.0	A	0	0	0.0	A	0	0				
	NB Approach		†	†	--	--	†	†	--	--				
	SB Thru		†	†	--	--	†	†	--	--				
	SB Approach		†	†	--	--	†	†	--	--				
9. US Route 17 (N-S) at Site Ent. #2 (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour			
	NB Right		0.0	A	0	0	0.0	A	0	0				
	NB Approach		†	†	--	--	†	†	--	--				
	SB Thru		†	†	--	--	†	†	--	--				
	SB Approach		†	†	--	--	†	†	--	--				

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.

m - Volume for 95th percentile queue is metered by upstream signal.



Belmont Park
Total 2023 Peak Hour Volumes
Stafford County, Virginia

Figure
6-1

7 2028 BACKGROUND CONDITIONS AND ANALYSIS

The background 2028 volumes were analyzed assuming existing intersection geometry with the addition of the southbound right turn lane conversion discussed above (as shown on Figure 7-1) in conjunction with projected background traffic volumes.

The background traffic volumes were developed based on a 2% annual growth rate and the completion of the Del Webb Development along Celebrate Virginia Parkway.

7.1 2028 BACKGROUND TRAFFIC GROWTH

The 2% annual growth rate discussed above was compounded annually for the 10-year period from 2018 to 2028 and applied to the through movements on U.S. Route 17 only. The resulting 2028 existing + growth volumes are shown on Figure 7-2.

7.2 2028 BACKGROUND TRAFFIC FORECASTS

The Del Webb development trips shown on Figure 4-3 were then added to the 2028 Existing + Growth volumes shown on Figure 7-2 to yield the total 2028 Background Traffic Forecasts which are shown on Figure 7-3.

7.3 2028 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

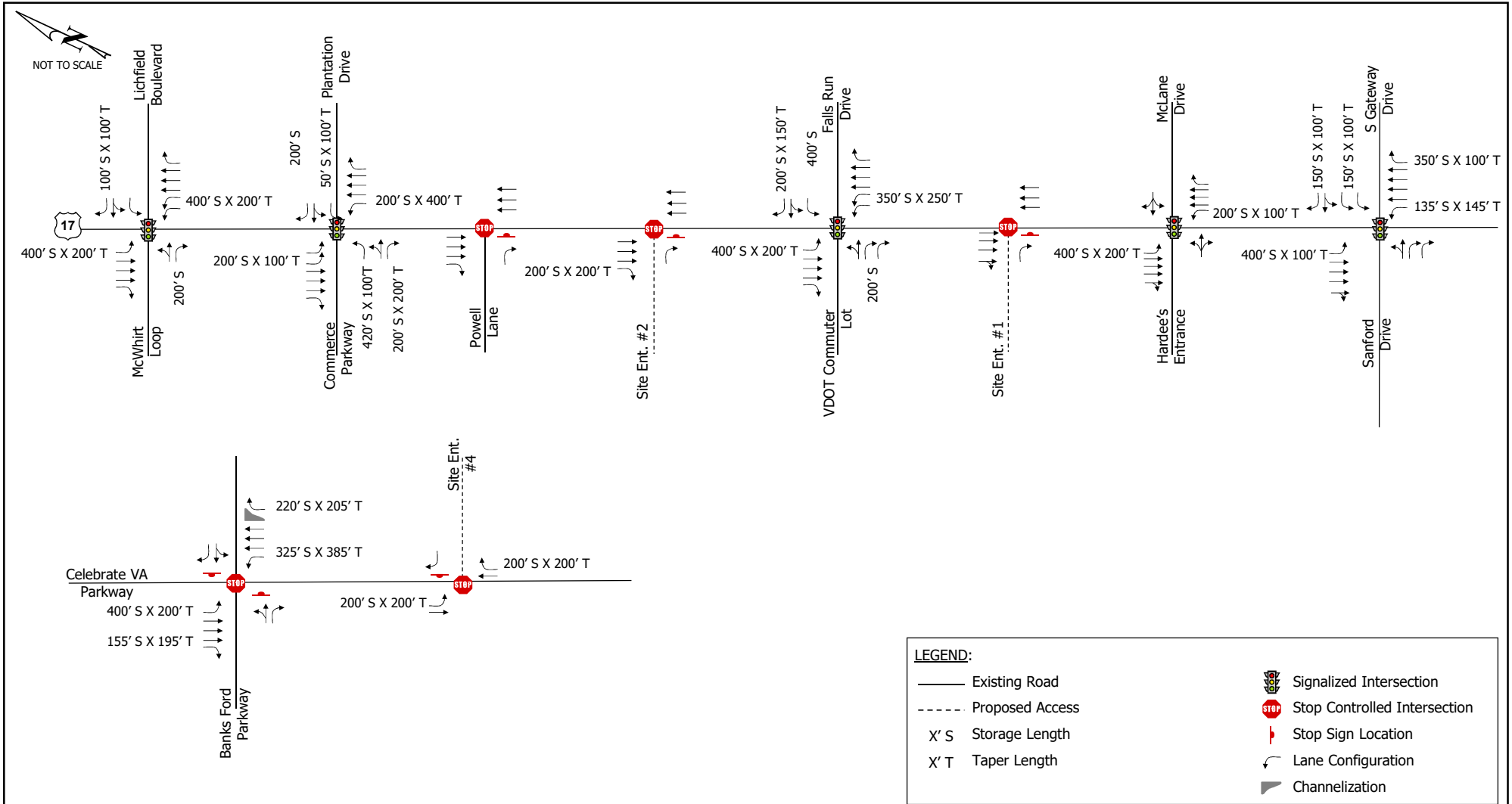
Table 7-1 summarizes the 2028 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2028 background peak hour traffic volumes shown on Figure 7-3, the future lane geometry shown on Figure 7-1, and the existing traffic signal timings. The corresponding SYNCHRO worksheets are included in Appendix G.

As indicated in Table 7-1, under 2028 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic but no new movements would spill back through the available storage.

**Table 7-1: Intersection Level of Service, Delay, and Queue Summary
2028 Background Conditions**

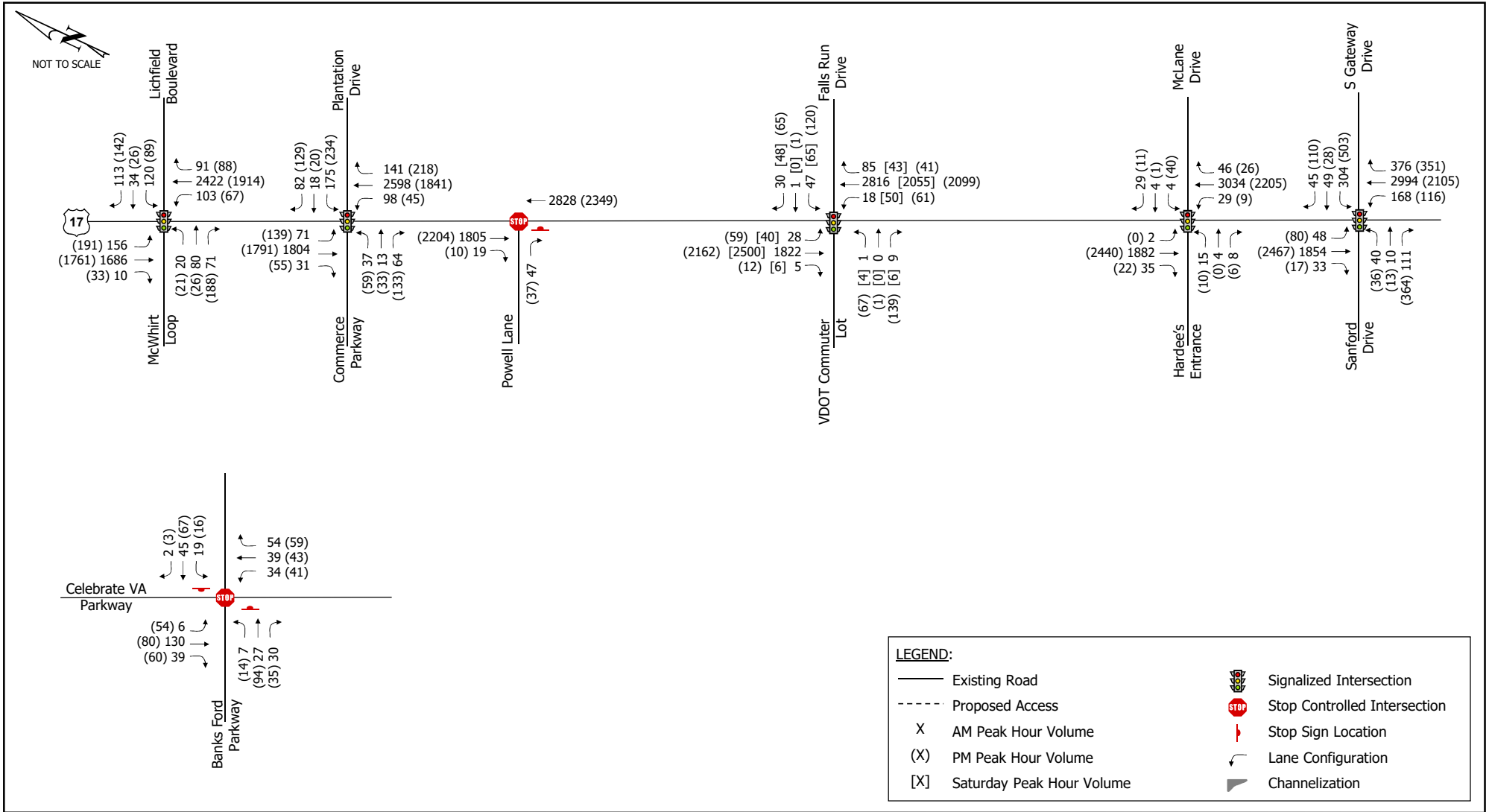
Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR				SATURDAY PEAK HOUR					
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)		
1. US Route 17 (N-S) at Sanford Drive (E) Stanstead Drive (W) Signalized	NB Left	135	74.0	E	#263	83	85.4	F	#215	399	Not Analyzed in this Peak Hour					
	NB Thru		61.8	E	#970	594	30.6	C	568	869						
	NB Right	350	17.7	B	134	10	4.5	A	12	50						
	NB Approach		57.7	E	--	--	29.6	C	--	--						
	SB Left	400	57.8	E	84	287	46.2	D	130	262						
	SB Thru-Right		26.7	C	441	596	16.2	B	75	527						
	SB Approach		27.5	C	--	--	17.1	B	--	--						
	EB Left-Thru		63.1	E	90	81	63.2	E	104	546						
	EB Right		36.3	D	8	95	51.6	D	227	483						
	EB Approach		44.5	D	--	--	53.0	D	--	--						
	WB Left	150	161.4	F	#231	604	134.4	F	#492	682						
	WB Thru		184.5	F	#282	750	53.0	D	56	871						
WB Right	150	56.5	E	0	374	53.0	D	14	156							
WB Approach		156.4	F	--	--	117.4	F	--	--							
Overall			54.0	D	--	--	36.9	D	--	--						
2. US Route 17 (N-S) at Hardee's Entrance (E) McLane Drive (W) Signalized	NB Left	350	73.9	E	68	10	71.2	E	0	0	Not Analyzed in this Peak Hour					
	NB Thru		15.3	B	#1182	347	4.1	A	63	326						
	NB Right		3.1	A	0	16	1.6	A	m0	3						
	NB Approach		15.7	B	--	--	4.3	A	--	--						
	SB Left	400	79.4	E	12	69	0.0	A	0	30						
	SB Thru-Right		7.4	A	289	521	0.6	A	23	145						
	SB Approach		7.4	A	--	--	0.6	A	--	--						
	EB L-T-R		74.4	E	55	69	61.9	E	0	53						
	EB Approach		74.4	E	--	--	61.9	E	--	--						
	WB L-T-R		71.3	E	48	60	67.4	E	104	123						
	WB Approach		71.3	E	--	--	67.4	E	--	--						
	Overall			13.3	B	--	--	3.5	A	--		--				
3. US Route 17 (N-S) at VDOT Commuter Lot (E) Falls Run Drive (W) Signalized	NB Left	350	68.1	E	59	64	64.7	E	m88	97	Not Analyzed in this Peak Hour	58.4	E	43	83	
	NB Thru		17.2	B	577	325	25.5	C	889	357		12.7	B	456	280	
	NB Right		8.9	A	0	39	10.3	B	m0	66		6.3	A	0	29	
	NB Approach		17.9	B	--	--	26.4	C	--	--		59.5	E	--	--	
	SB Left	400	59.2	E	21	19	38.9	D	m53	53		58.4	E	73	115	
	SB Thru		43.5	D	#1234	307	4.5	A	100	227		16.0	B	660	505	
	SB Right		8.0	A	0	79	11.4	B	m0	27		6.0	A	0	0	
	SB Approach		42.6	D	--	--	5.6	A	--	--		16.6	B	--	--	
	EB Left-Thru		63.9	E	8	6	66.9	E	147	138		59.6	E	15	32	
	EB Right	200	63.6	E	0	33	61.3	E	23	164		59.2	E	0	39	
	EB Approach		63.6	E	--	--	63.1	E	--	--		59.4	E	--	--	
	WB Left	400	66.6	E	56	282	66.3	E	136	165		58.8	E	66	132	
WB Left-Thru		66.4	E	56	79	66.5	E	140	132	58.8	E	66	95			
WB Right	200	61.8	E	0	50	61.5	E	0	70	56.5	E	0	71			
WB Approach		64.6	E	--	--	64.7	E	--	--	57.8	E	--	--			
Overall			33.5	C	--	--	20.7	C	--	--	16.3	B	--	--		
4. US Route 17 (N-S) at Powell Lane (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour					
	NB Right		†	†	--	--	†	†	--	--						
	NB Approach		†	†	--	--	†	†	--	--						
	SB Thru		†	†	--	--	†	†	--	--						
	SB Approach		†	†	--	--	†	†	--	--						
	EB Right		10.2	B	6	70	10.4	B	12	--						
EB Approach		10.2	B	--	--	10.4	B	--	--							
5. US Route 17 (N-S) at Commerce Parkway (E) Plantation Drive (W) Signalized	NB Left	200	72.0	E	70	191	38.7	D	m104	121	Not Analyzed in this Peak Hour					
	NB Thru		31.1	C	794	588	7.3	A	195	250						
	NB Right		13.2	B	0	29	7.9	A	m104	27						
	NB Approach		32.3	C	--	--	9.5	A	--	--						
	SB Left	100	80.0	E	175	356	94.2	F	m59	101						
	SB Thru		78.1	E	#1406	799	9.5	A	247	329						
	SB Right		10.2	B	23	340	2.8	A	m0	57						
	SB Approach		74.8	E	--	--	10.6	B	--	--						
	EB Left	420	78.3	E	66	19	66.0	E	112	38						
	EB Left-Thru		78.3	E	67	99	65.3	E	104	258						
	EB Right	200	75.3	E	0	52	63.0	E	35	163						
	EB Approach		76.6	E	--	--	64.0	E	--	--						
WB Left	50	80.8	F	178	149	60.8	E	240	193							
WB Thru		80.3	F	181	154	60.1	E	237	196							
WB Right	200	68.3	E	0	74	52.8	D	25	125							
WB Approach		76.9	E	--	--	57.9	E	--	--							
Overall			59.0	E	--	--	17.7	B	--	--						
6. US Route 17 (N-S) at McWhirt Loop (E) Lichfield Road (W) Signalized	NB Left	400	81.5	F	#231	231	57.0	E	284	268	Not Analyzed in this Peak Hour					
	NB Thru		14.2	B	113	255	11.9	B	48	170						
	NB Right		16.5	B	m0	10	11.0	B	m0	12						
	NB Approach		19.7	B	--	--	16.2	B	--	--						
	SB Left	400	56.2	E	77	322	59.6	E	m50	72						
	SB Thru		144.8	F	#1130	721	16.2	B	302	218						
	SB Right		18.8	B	0	119	19.9	B	m0	21						
	SB Approach		137.0	F	--	--	17.8	B	--	--						
	EB Left-Thru		75.6	E	#179	175	69.5	E	178	229						
	EB Right	200	55.2	E	0	101	64.4	E	140	187						
	EB Approach		67.2	E	--	--	66.0	E	--	--						
	WB Left		82.4	F	#157	122	65.3	E	130	131						
WB Left-Thru		81.2	F	#156	128	64.8	E	124	121							
WB Right	100	57.1	E	0	107	61.7	E	71	155							
WB Approach		71.3	E	--	--	63.1	E	--	--							
Overall			86.4	F	--	--	23.5	C	--	--						
7. Banks Ford Parkway (N-S) at Celebrate Parkway (E-W) Unsignalized	NB Left-Thru	400	10.6	B	5	47	13.3	B	23	57	Not Analyzed in this Peak Hour					
	NB Right		8.7	A	3	46	8.7	A	4	46						
	NB Approach		9.7	A	--	--	12.0	B	--	--						
	SB Left-Thru		11.3	B	10	39	14.0	B	19	41						
	SB Right		8.4	A	0	10	8.4	A	0	15						
	SB Approach		11.2	B	--	--	13.8	B	--	--						
	EB Left	400	7.5	A	3	25	7.5	A	3	17						
	EB Thru		†	†	--	--	†	†	--	--						
	EB Right	155	†	†	--	--	†	†	--	--						
	EB Approach		3.0	A	--	--	2.6	A	--	--						
	WB Left	325	7.3	A	0	4	7.4	A	3	14						
	WB Thru		†	†	--	--	†	†	--	--						
WB Right	220	†	†	--	--	†	†	--	--							
WB Approach		0.5	A	--	--	2.7	A	--	--							

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.
m - Volume for 95th percentile queue is metered by upstream signal.



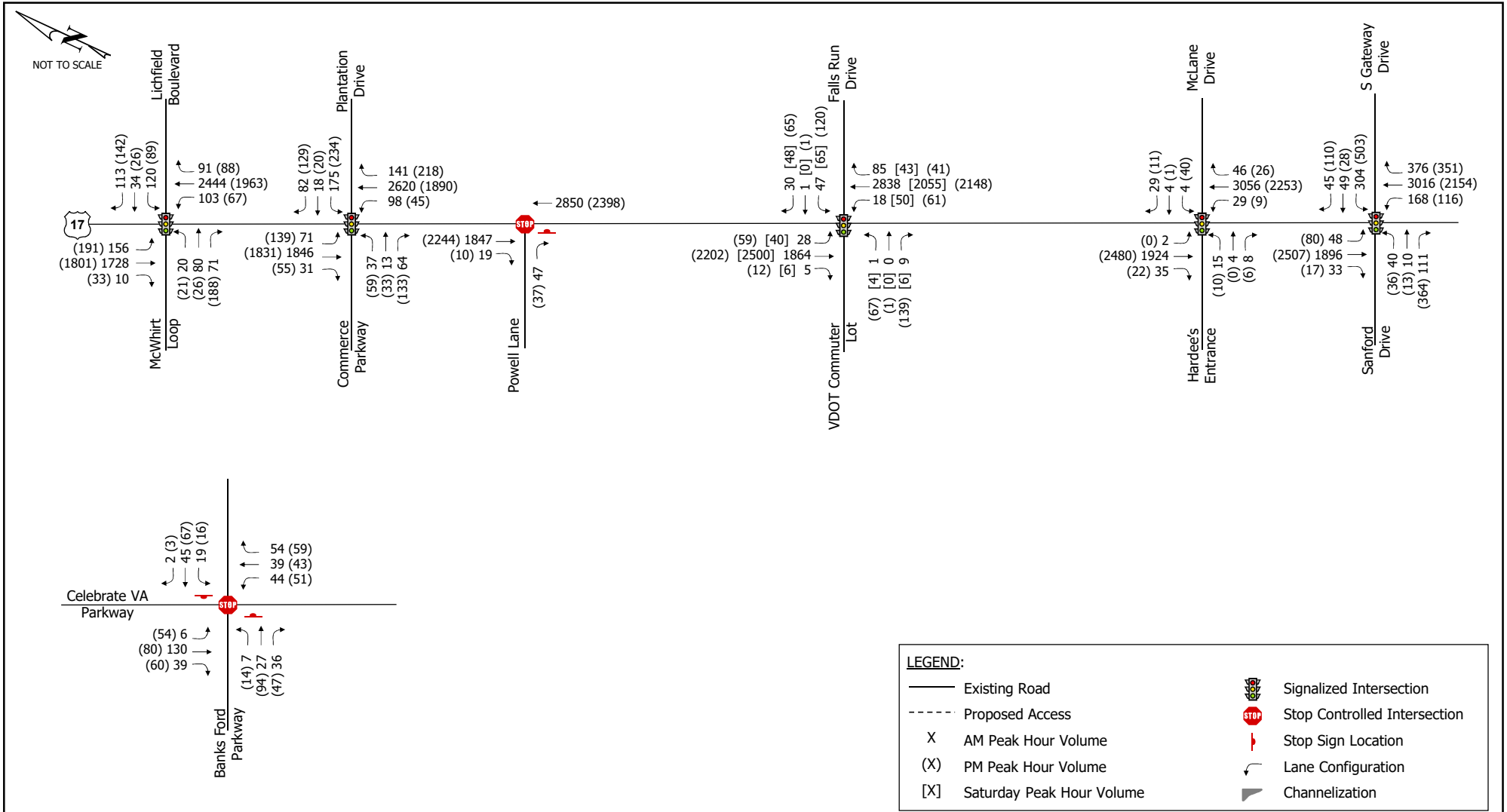
Belmont Park
 Future 2028 Lane Use and Traffic Control
 Stafford County, Virginia

Figure
 7-1



Belmont Park
Existing + Growth 2028 Peak Hour Volumes
Stafford County, Virginia

Figure
7-2



Belmont Park
Total Background 2028 Peak Hour Volumes
Stafford County, Virginia

Figure
7-3

8 PHASE 2 SITE TRIP GENERATION AND DISTRIBUTION

8.1 PHASE 1 TRIP GENERATION

As detailed above, the proposed development is anticipated to be built in two separate phases with Phase 1 completed in 2023 and Phase 2 in 2028. Phase 2 is assumed to include the following:

Phase 2:

- 214 Age Restricted Townhomes;
- 198 Age Restricted Apartments; and
- A 100 bed Assisted Living Facility.

Additionally, with Phase 2, a partial access (right-in/right-out/left-in) entrance on Celebrate Virginia Parkway.

As shown on Table 5-2, Phase 2 will generate a total of 96 AM peak hour primary trips (39 in and 57 out), 1110 PM peak hour primary trips (57 in and 53 out), 138 Saturday peak hour primary trips (81 in and 57 out), and 1,575 daily primary trips.

8.2 PRIMARY TRIP DISTRIBUTIONS

With the new access point on Celebrate Virginia Parkway, the primary residential distributions discussed above were reassigned to the local roadway network and site entrances as shown on Figure 8-1.

8.3 PHASE 2 PRIMARY SITE TRIP ASSIGNMENT

The trip distribution percentages for the primary trips were applied to the Phase 2 trip generation shown in Table 5-2 to distribute the primary trips to the surrounding roadway network. The resulting site generated primary trips are shown in Figure 8-2.

8.4 PHASE 1 DIVERSIONS (WITH CELEBRATE VIRGINIA PARKWAY ACCESS)

As discussed above, the new access point on Celebrate Virginia Parkway would result in a new distribution pattern for both the residential and commercial Phase 1 trips.

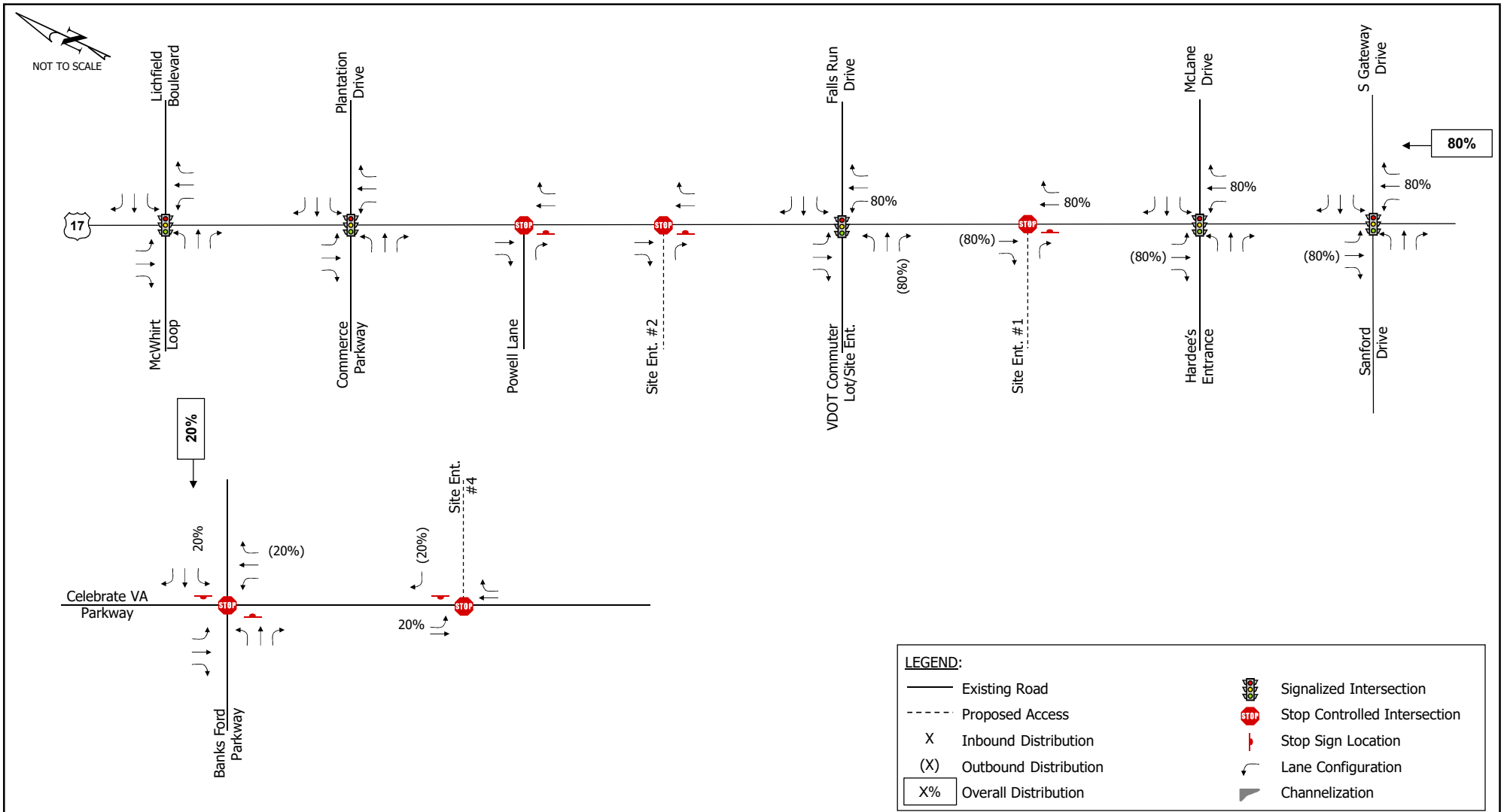
8.4.1 PHASE 1 RESIDENTIAL AND COMMERCIAL DIVERSIONS

The diversions in Phase 1 residential traffic associated with the Celebrate Virginia Parkway access point on shown on Figure 8-3 (diverted distribution percentages) and Figure 8-4 (diverted trips).

The Phase 1 commercial traffic associated with the Celebrate Virginia Parkway access point was redistributed as shown on Figure 8-5 (distribution percentages) and Figure 8-6 (commercial trips).

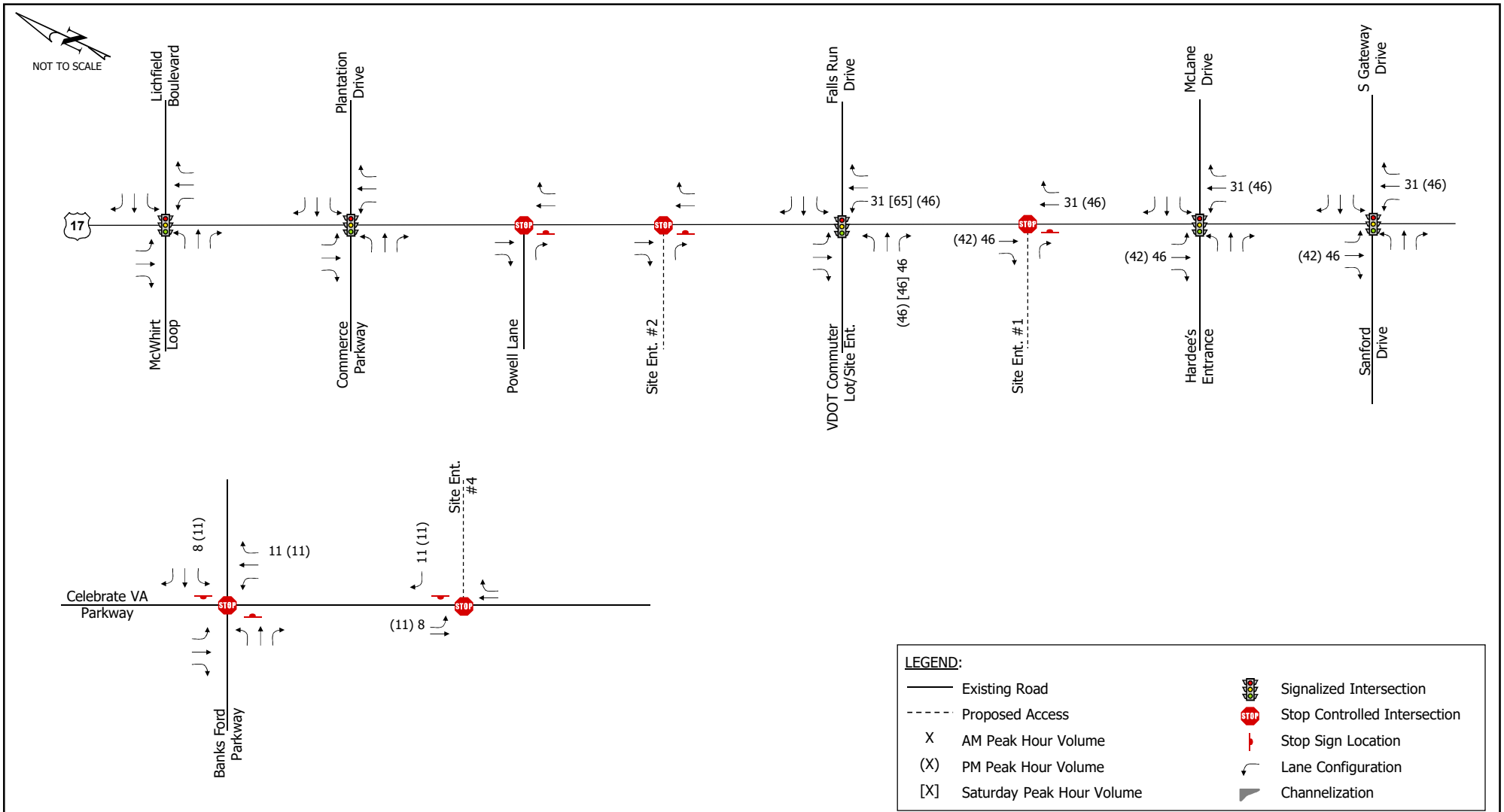
8.5 TOTAL SITE TRIPS

The Phase 2 residential trips (Figure 8-2), the Phase 1 diverted residential trips (Figure 8-4), and the Phase 1 diverted commercial trips (Figure 8-6) were then added to the Phase 1 total site trips (Figure 5-6) and the resulting total site trips for the development (Phase 1 + Phase 2) are shown in Figure 8-7.



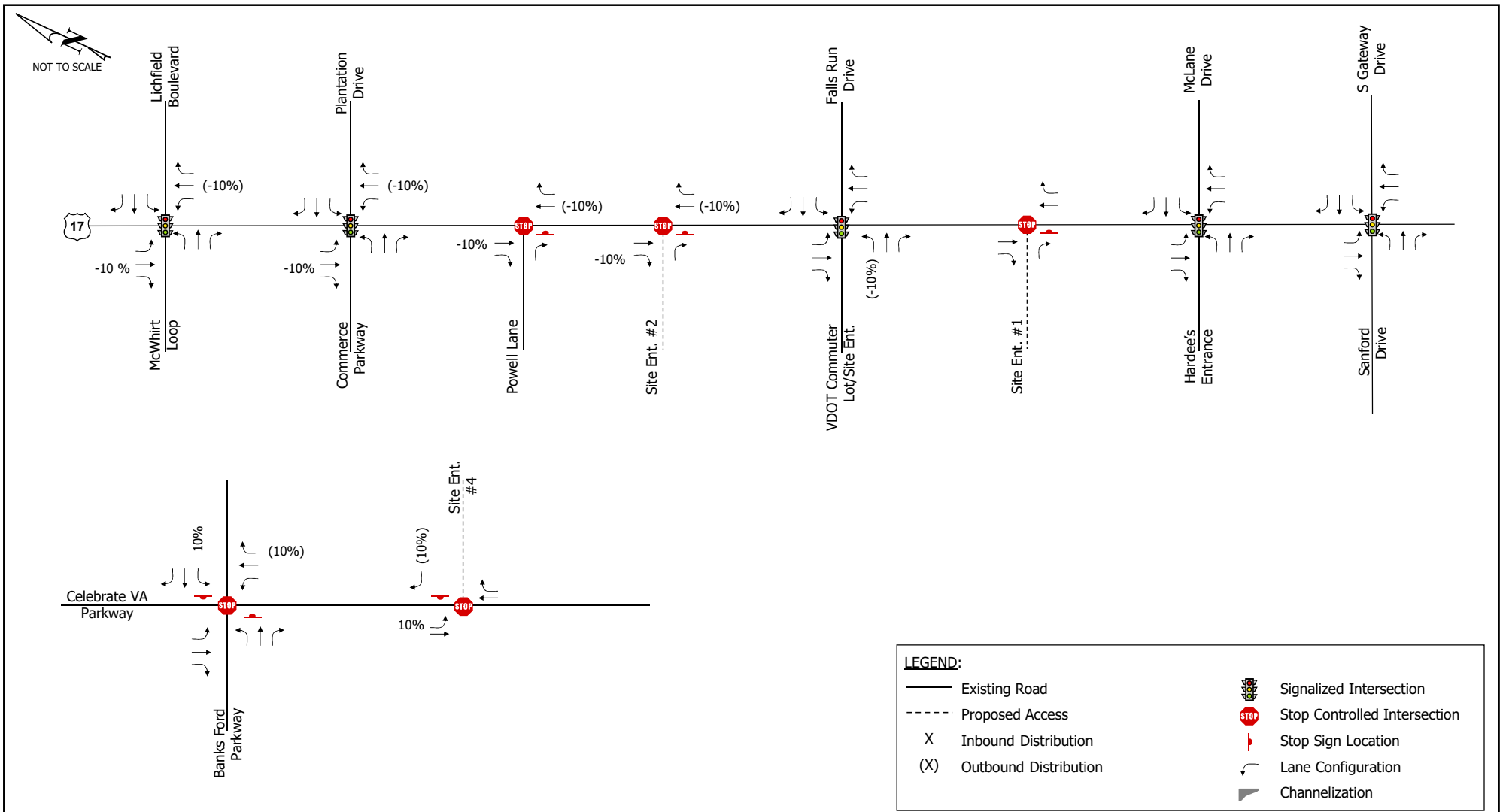
Belmont Park
Phase 2 External Site Trip Distributions - Residential
Stafford County, Virginia

Figure
8-1



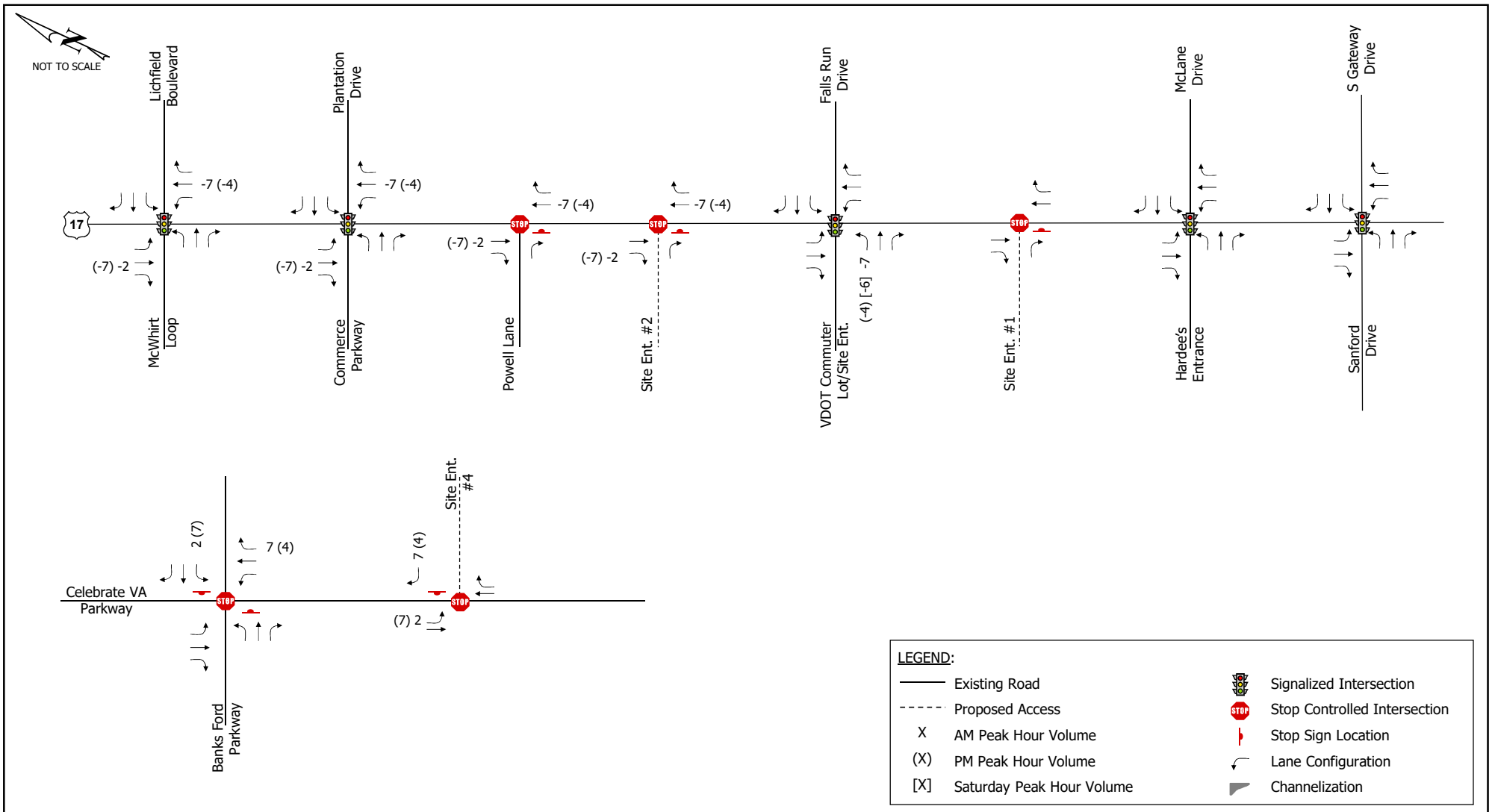
Belmont Park
Phase 2 External Primary Site Trips - Residential
Stafford County, Virginia

Figure
8-2



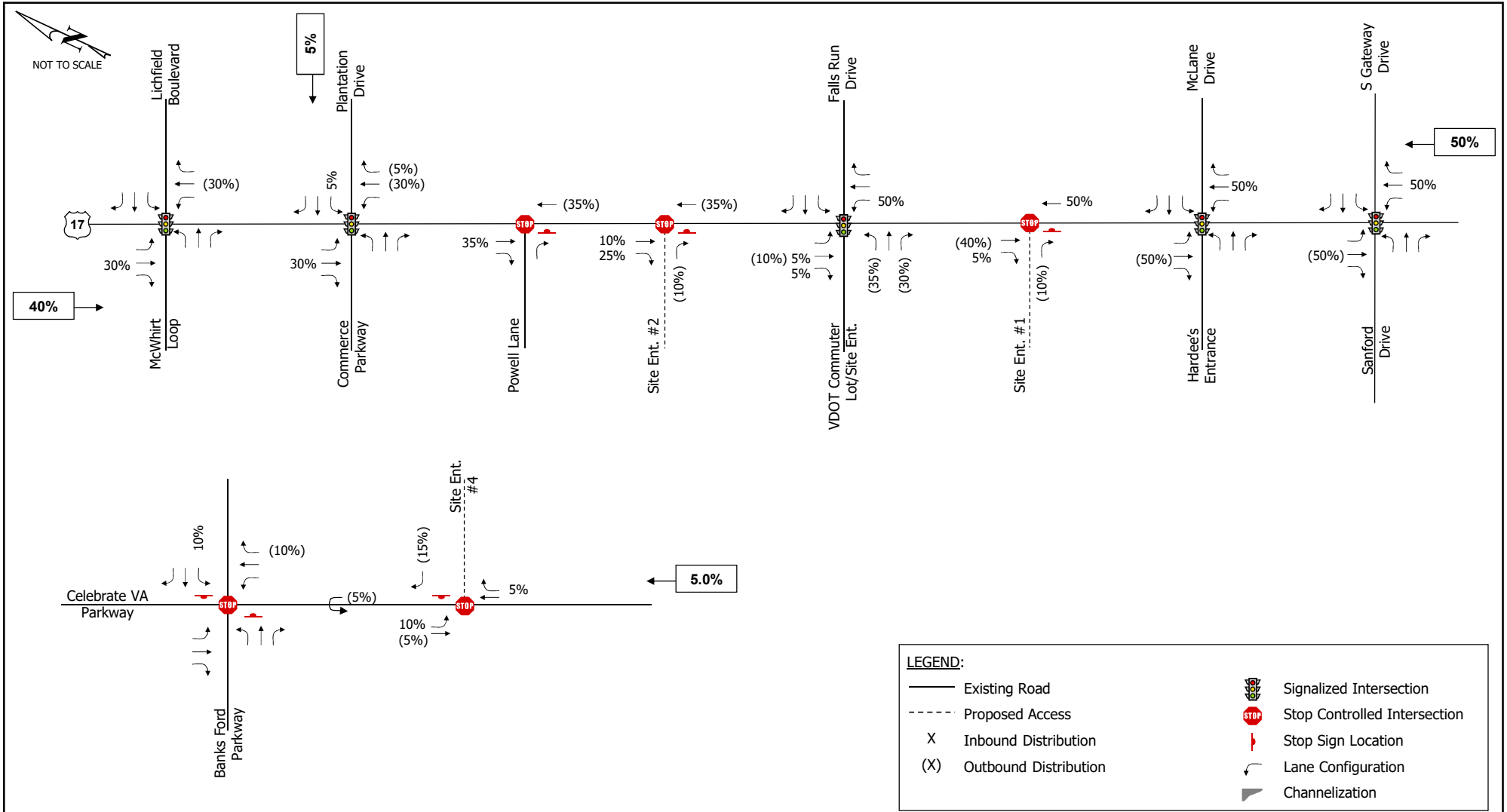
Belmont Park
 Diverted Phase 1 Residential Distributions (with Celebrate Access)
 Stafford County, Virginia

Figure
 8-3



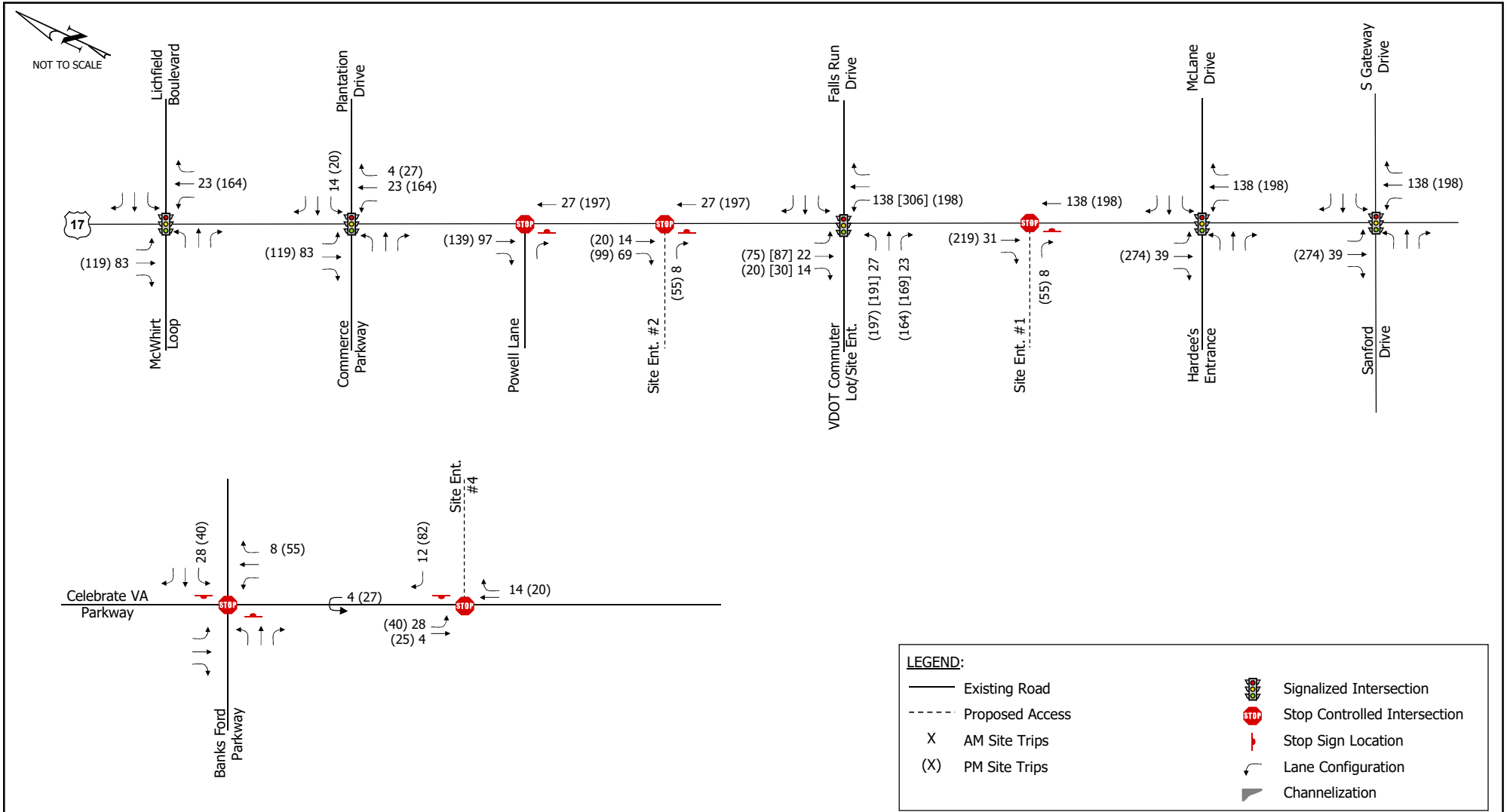
Belmont Park
 Diverted Phase 1 Residential Site Peak Hour Trips (with Celebrate Access)
 Stafford County, Virginia

Figure
 8-4



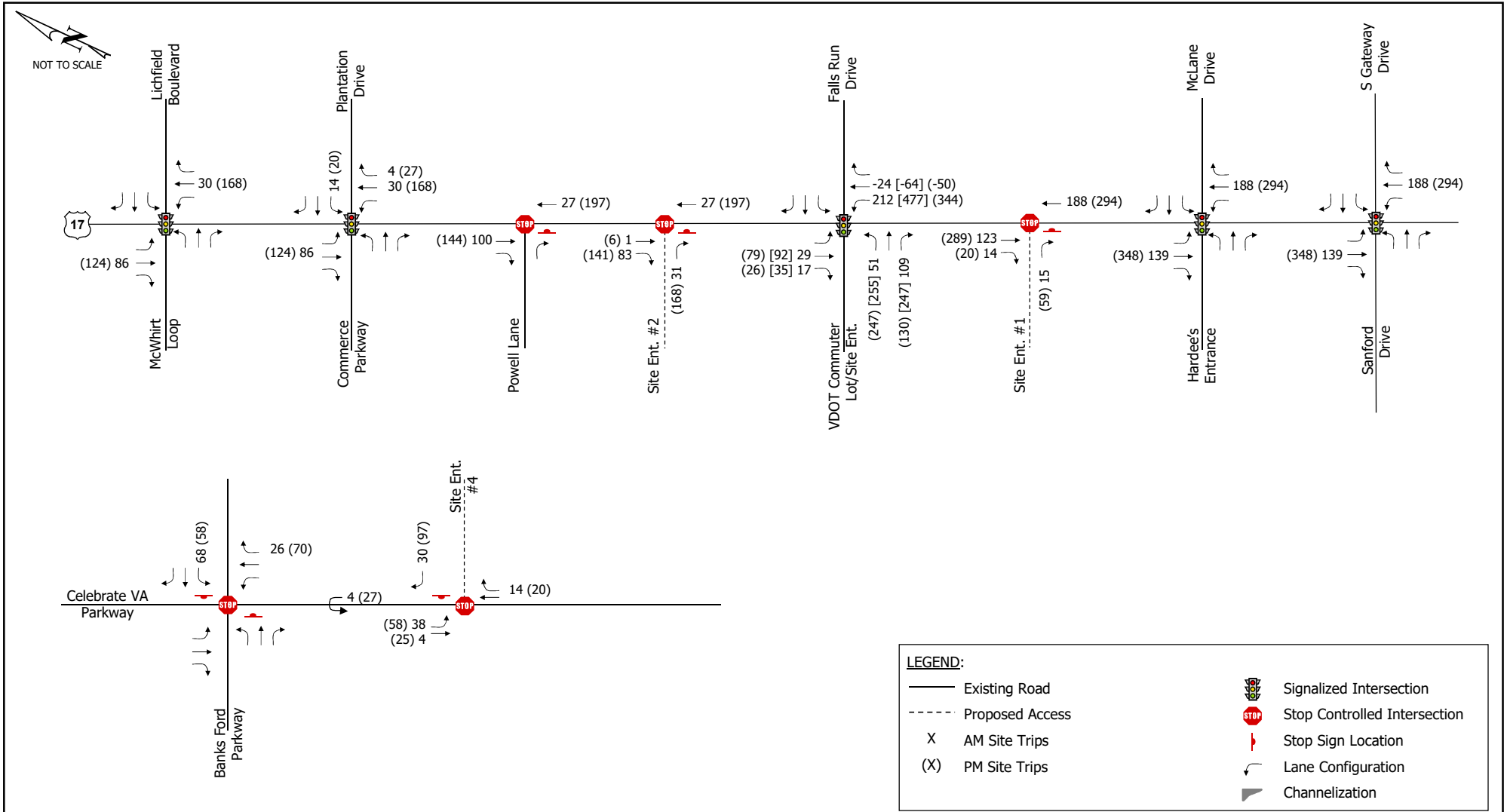
Belmont Park
 Phase 1 Commercial Distributions (with Celebrate Access)
 Stafford County, Virginia

Figure
 8-5



Belmont Park
 Phase 1 External Primary Site Trips – Commercial (with Celebrate Access)
 Stafford County, Virginia

Figure
 8-6



Belmont Park
Total External Site Trips (Phase 1 + Phase 2)
Stafford County, Virginia

Figure
8-7

9 ANALYSIS OF 2028 CONDITIONS WITH DEVELOPMENT

To complete the analysis of the 2028 total conditions (with full buildout of the proposed development), the estimated site trips were added to the background 2028 volumes. The projected volumes were then used to complete the capacity analysis.

9.1 2028 TOTAL TRAFFIC VOLUMES

To generate the 2028 total future traffic volumes, the total site trips shown on Figure 8-7 were added to the background 2028 traffic volumes shown on Figure 7-3. The resulting future volumes are shown in Figure 9-1.

9.2 CAPACITY ANALYSES

Table 9-1 summarizes the 2028 total future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2028 future peak hour traffic volumes shown on Figure 9-1, the future lane geometry (Figure 7-1), and optimized traffic signal timings. The corresponding SYNCHRO worksheets are included in Appendix H.

As indicated in Table 9-1, under 2028 future conditions, the majority of the study intersections would operate at comparable LOS and queuing to background conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.

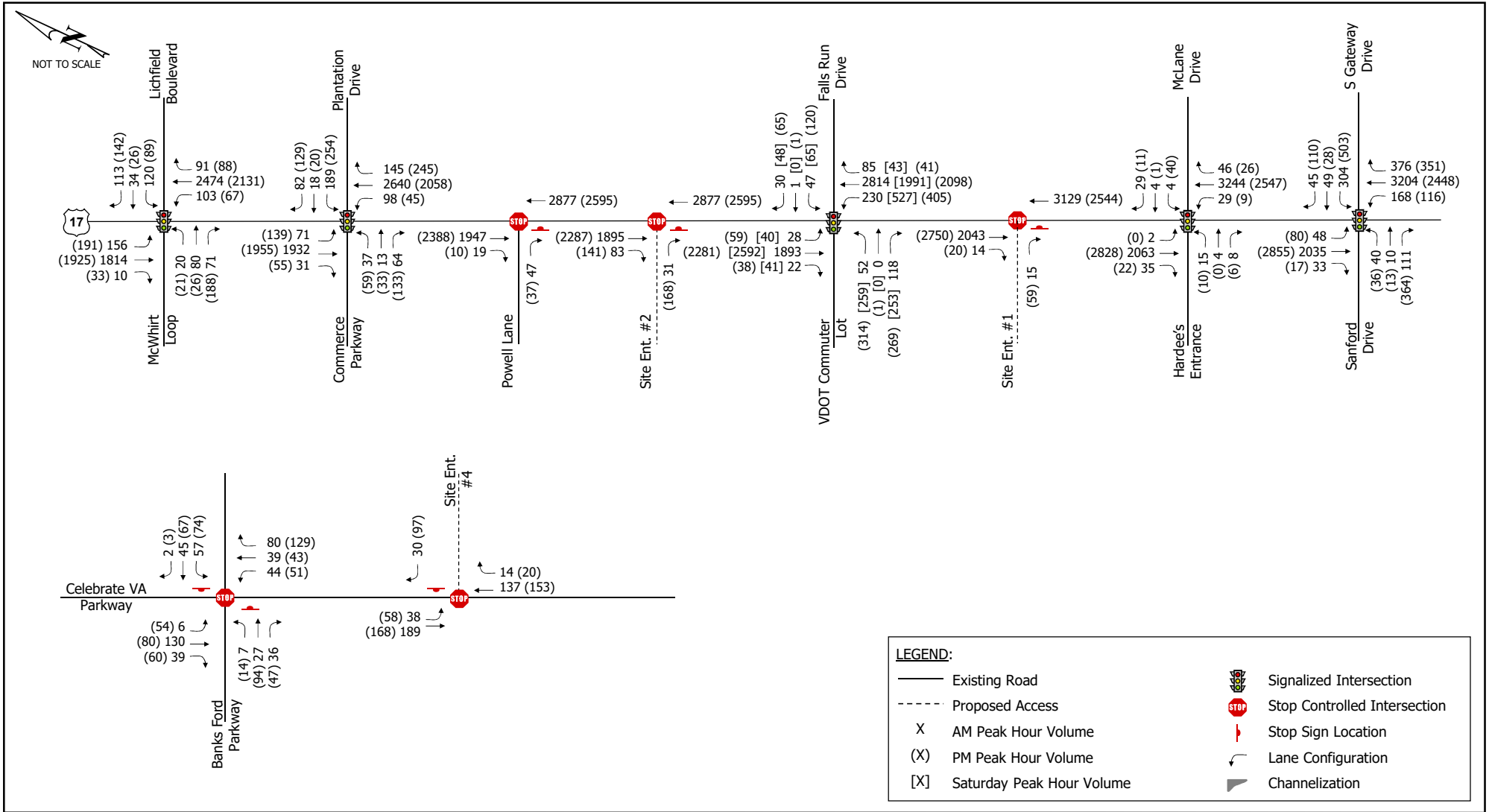
The diversion of site traffic with the Celebrate Virginia Parkway entrance improves the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection. The intersection would operate better under 2028 conditions than under 2023 conditions.

All other site entrances operate at LOS C or better in all peak hours.

Table 9-1: Intersection Level of Service, Delay, and Queue Summary 2028 Future Conditions

Table with columns: Intersection and Type of Control, Movement and Approach, Effective Turn Lane Storage (ft), AM PEAK HOUR (Delay, LOS, SYNCHRO 95th Percentile Queue Length, SimTraffic Max Queue Length), PM PEAK HOUR (Delay, LOS, SYNCHRO 95th Percentile Queue Length, SimTraffic Max Queue Length), SATURDAY PEAK HOUR (Delay, LOS, SYNCHRO 95th Percentile Queue Length, SimTraffic Max Queue Length). Rows include intersections like US Route 17 (N-S) at Sanford Drive (E) and US Route 17 (N-S) at Hardee's Entrance (E).

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.
2 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.
m - Volume for 95th percentile queue is metered by upstream signal.



Belmont Park
Total 2028 Peak Hour Volumes
Stafford County, Virginia

Figure
9-1

10 2034 BACKGROUND CONDITIONS AND ANALYSIS

In accordance with Chapter 527 Guidelines, this analysis examines a buildout plus six-year scenario (2034).

The background 2034 volumes were analyzed assuming existing intersection geometry with the addition of the southbound right turn lane conversion discussed above (as shown on Figure 7-1) in conjunction with projected background traffic volumes.

The background traffic volumes were developed based on a 2% annual growth rate and the completion of the Del Webb Development along Celebrate Virginia Parkway.

10.1 2034 BACKGROUND TRAFFIC GROWTH

The 2% annual growth rate discussed above was compounded annually for the 16-year period from 2018 to 2034 and applied to the through movements on U.S. Route 17 only. The resulting 2034 existing + growth volumes are shown on Figure 10-1.

10.2 2034 BACKGROUND TRAFFIC FORECASTS

The Del Webb development trips shown on Figure 4-3 were then added to the 2034 Existing + Growth volumes shown on Figure 10-1 to yield the total 2034 Background Traffic Forecasts which are shown on Figure 10-2.

10.3 2034 BACKGROUND TRAFFIC VOLUME CAPACITY ANALYSIS

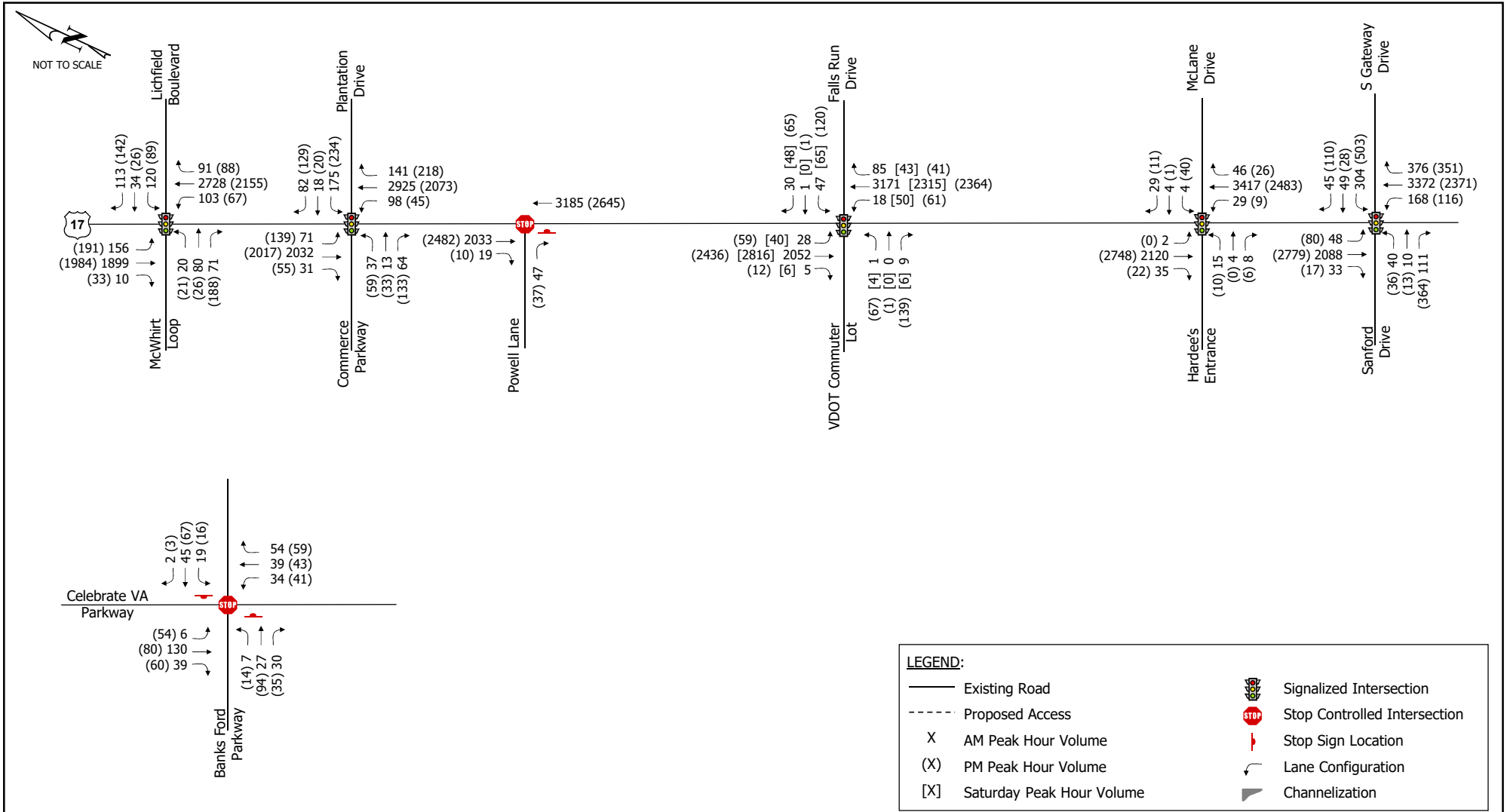
Table 10-1 summarizes the 2034 background intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2028 background peak hour traffic volumes shown on Figure 10-2, the future lane geometry shown on Figure 7-1, and the existing traffic signal timings. The corresponding SYNCHRO worksheets are included in Appendix I.

As indicated in Table 10-1, under 2034 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic but no new movements would spill back through the available storage.

**Table 10-1: Intersection Level of Service, Delay, and Queue Summary
2034 Background Conditions**

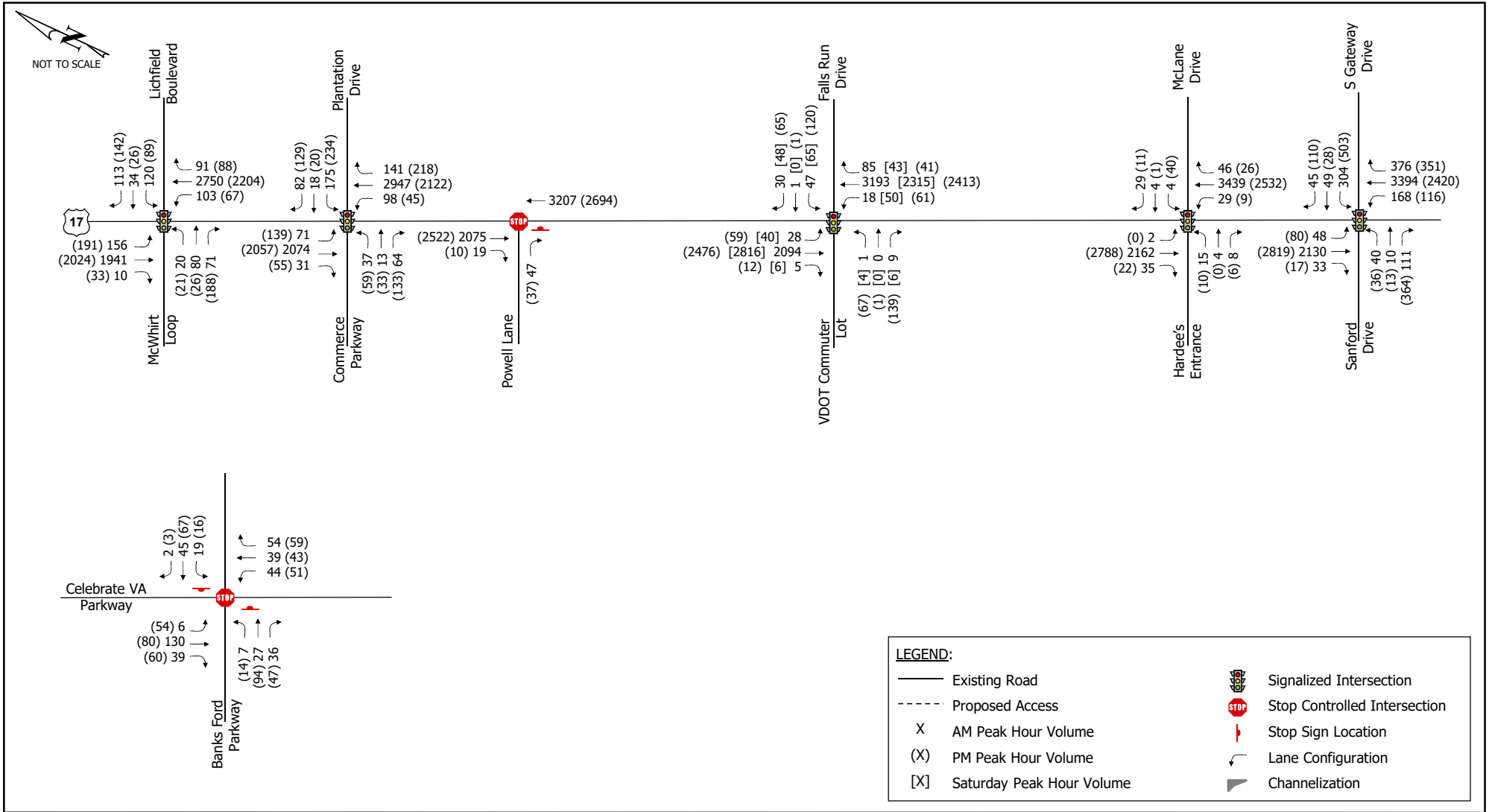
Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR				SATURDAY PEAK HOUR								
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)					
1. US Route 17 (N-S) at Sanford Drive (E) Stanstead Drive (W) Signalized	NB Left	135	73.2	E	#261	139	85.2	F	#213	551	Not Analyzed in this Peak Hour								
	NB Thru		114.4	F	#1160	709	48.7	D	#906	1045									
	NB Right	350	18.1	B	152	10	4.8	A	14	5									
	NB Approach		103.3	F	--	--	45.3	D	--	--									
	SB Left	400	57.8	E	84	297	51.0	D	129	270									
	SB Thru-Right		29.2	C	511	579	21.3	C	495	574									
	SB Approach		29.8	C	--	--	22.2	C	--	--									
	EB Left-Thru		69.6	E	#124	112	63.6	E	111	520									
	EB Right		36.3	D	28	127	54.0	D	269	474									
	EB Approach		46.3	D	--	--	55.0	D	--	--									
	WB Left	150	305.6	F	#319	715	189.8	F	#579	643									
	WB Thru		325.7	F	#382	709	53.0	D	56	826									
	WB Right	150	56.6	E	0	383	53.1	D	31	159									
WB Approach		282.5	F	--	--	161.8	F	--	--										
Overall			92.0	F	--	--	51.5	D	--	--									
2. US Route 17 (N-S) at Hardee's Entrance (E) McLane Drive (W) Signalized	NB Left	350	73.9	E	68	8	64.9	E	--	--	Not Analyzed in this Peak Hour								
	NB Thru		36.0	D	#1604	438	3.1	A	m43	1218									
	NB Right		3.3	A	0	19	1.9	A	m0	140									
	NB Approach		35.8	D	--	--	3.3	A	--	--									
	SB Left	400	79.4	E	12	71	0.0	A	0	29									
	SB Thru-Right		8.2	A	350	571	1.1	A	54	371									
	SB Approach		8.3	A	--	--	1.1	A	--	--									
	EB L-T-R		74.4	E	67	79	60.4	E	0	62									
	EB Approach		74.4	E	--	--	60.4	E	--	--									
	WB L-T-R		70.4	E	52	81	65.9	E	115	185									
	WB Approach		70.4	E	--	--	65.9	E	--	--									
	Overall			26.0	C	--	--	3.2	A	--					--				
	3. US Route 17 (N-S) at VDOT Commuter Lot (E) Falls Run Drive (W) Signalized	NB Left	350	68.1	E	59	56	65.8	E	m80					323	58.4	E	43	75
NB Thru			19.5	B	687	346	31.2	C	1010	1383	14.8	B	576	304					
NB Right			9.1	A	0	39	10.6	B	m0	227	6.3	A	0	45					
NB Approach			20.1	C	--	--	32.0	C	--	--	15.5	B	--	--					
SB Left		400	59.2	E	21	14	43.8	D	m46	50	59.5	E	73	124					
SB Thru			91.3	F	#1465	370	10.5	B	208	287	21.4	C	#912	519					
SB Right			8.1	A	0	97	11.6	B	m0	26	6.0	A	0	0					
SB Approach			88.9	F	--	--	11.3	B	--	--	21.9	C	--	--					
EB Left-Thru			63.9	E	8	6	68.6	E	162	150	59.6	E	15	36					
EB Right		200	63.6	E	0	39	61.1	E	37	184	59.2	E	0	39					
EB Approach			63.6	E	--	--	63.6	E	--	--	59.4	E	--	--					
WB Left		400	68.8	E	71	363	67.5	E	152	191	58.8	E	66	133					
WB Left-Thru			68.8	E	71	70	67.8	E	153	158	58.8	E	66	85					
WB Right	200	61.4	E	0	56	61.3	E	0	75	56.5	E	0	71						
WB Approach		66.0	E	--	--	65.4	E	--	--	57.8	E	--	--						
Overall			62.2	E	--	--	25.9	C	--	--	19.9	B	--	--					
4. US Route 17 (N-S) at Powell Lane (E) Unsignalized	NB Thru		†	†	--	--	†	†	--	--	Not Analyzed in this Peak Hour								
	NB Right		†	†	--	--	†	†	--	--									
	NB Approach		†	†	--	--	†	†	--	--									
	SB Thru		†	†	--	--	†	†	--	--									
	SB Right		†	†	--	--	†	†	--	--									
	SB Approach		†	†	--	--	†	†	--	--									
	EB Right		12.0	B	17	151	11.4	B	16	151									
EB Approach		12.0	B	--	--	11.4	B	--	--										
5. US Route 17 (N-S) at Commerce Parkway (E) Plantation Drive (W) Signalized	NB Left	200	72.1	E	70	228	41.5	D	m95	123	Not Analyzed in this Peak Hour								
	NB Thru		40.5	D	#1048	676	12.0	B	396	338									
	NB Right		14.7	B	0	34	8.2	A	m1	29									
	NB Approach		41.1	D	--	--	13.7	B	--	--									
	SB Left	100	80.0	E	175	426	89.3	F	m51	100									
	SB Thru		158.0	F	#1727	1089	16.0	B	536	375									
	SB Right		10.4	B	23	679	3.2	A	m0	55									
	SB Approach		149.0	F	--	--	16.2	B	--	--									
	EB Left	420	78.3	E	77	22	67.0	E	125	50									
	EB Left-Thru		78.5	E	81	114	65.7	E	106	492									
	EB Right	200	74.8	E	0	63	63.3	E	61	265									
	EB Approach		76.3	E	--	--	64.5	E	--	--									
	WB Left	50	71.3	E	227	190	61.5	E	268	213									
WB Thru		79.7	E	224	192	60.6	E	262	220										
WB Right	200	65.3	E	0	96	52.0	D	47	145										
WB Approach		75.9	E	--	--	58.0	E	--	--										
Overall			102.9	F	--	--	21.9	C	--	--									
6. US Route 17 (N-S) at McWhirt Loop (E) Lichfield Road (W) Signalized	NB Left	400	82.5	F	#235	236	53.7	D	284	266	Not Analyzed in this Peak Hour								
	NB Thru		17.9	B	247	290	12.0	B	54	230									
	NB Right		16.2	B	m0	10	11.0	B	m0	14									
	NB Approach		22.8	C	--	--	15.6	B	--	--									
	SB Left	400	56.1	E	77	300	57.9	E	m44	71									
	SB Thru		200.7	F	#1321	693	37.9	D	#971	259									
	SB Right		18.4	B	0	160	20.0	B	m0	46									
	SB Approach		189.9	F	--	--	37.8	D	--	--									
	EB Left-Thru		60.6	E	92	98	70.0	E	181	308									
	EB Right	200	56.7	E	0	89	69.4	E	#211	231									
	EB Approach		58.0	E	--	--	69.6	E	--	--									
	WB Left		107.6	F	#214	155	65.9	E	145	141									
	WB Left-Thru		107.4	F	#216	153	64.9	E	132	122									
WB Right	100	56.7	E	13	148	61.6	E	81	173										
WB Approach		85.3	F	--	--	63.3	E	--	--										
Overall			116.7	F	--	--	32.3	C	--	--									
7. Banks Ford Parkway (N-S) at Celebrate Parkway (E-W) Unsignalized	NB Left-Thru	400	10.6	B	5	46	14.1	B	29	59	Not Analyzed in this Peak Hour								
	NB Right		8.8	A	4	51	8.8	A	5	44									
	NB Approach		9.7	A	--	--	12.5	B	--	--									
	SB Left-Thru		11.4	B	11	40	15.7	C	29	42									
	SB Right		8.4	A	0	17	8.5	A	1	14									
	SB Approach		11.3	B	--	--	15.2	C	--	--									
	EB Left	400	7.5	A	2	17	7.6	A	3	19									
	EB Thru		†	†	--	--	†	†	--	--									
	EB Right	155	†	†	--	--	†	†	--	--									
	EB Approach		2.4	A	--	--	2.3	A	--	--									
	WB Left	325	7.3	A	0	7	7.4	A	3	12									
	WB Thru		†	†	--	--	†	†	--	--									
	WB Right	220	†	†	--	--	†	†	--	--									
WB Approach		0.5	A	--	--	2.5	A	--	--										

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.
 m - Volume for 95th percentile queue is metered by upstream signal.



Belmont Park
 Existing + Growth 2034 Peak Hour Volumes (Plus 6 Scenario)
 Stafford County, Virginia

Figure
 10-1



Belmont Park
Total Background 2034 Peak Hour Volumes (Plus 6 Scenario)
Stafford County, Virginia

Figure
10-2

11 ANALYSIS OF 2034 CONDITIONS WITH DEVELOPMENT

To complete the analysis of the 2034 total conditions (buildout plus six years), the estimated site trips were added to the background 2034 volumes. The projected volumes were then used to complete the capacity analysis.

11.1 2034 TOTAL TRAFFIC VOLUMES

To generate the 2034 total future traffic volumes, the total site trips shown on Figure 8-7 were added to the background 2034 traffic volumes shown on Figure 10-2. The resulting future volumes are shown in Figure 11-1.

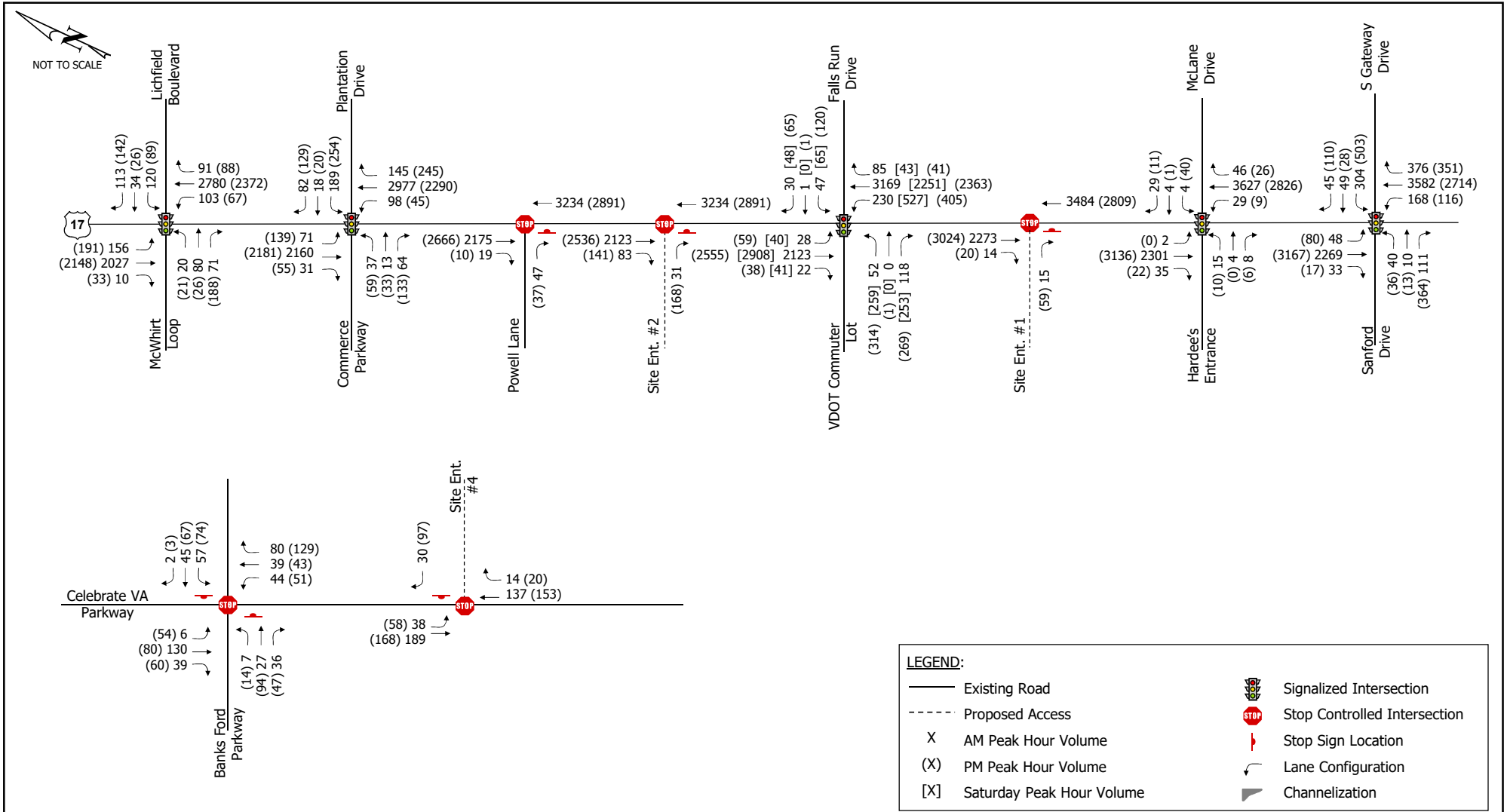
11.2 CAPACITY ANALYSES

Table 11-1 summarizes the 2034 total future intersection LOS, delay, 95th percentile (Synchro) and maximum (SimTraffic) queue lengths based on the 2034 future peak hour traffic volumes shown on Figure 11-1, the future lane geometry (Figure 7-1), and optimized traffic signal timings. The corresponding SYNCHRO worksheets are included in Appendix J.

As indicated in Table 11-1, under 2034 future conditions, the majority of the study intersections would operate at comparable LOS and queueing to 2028 conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.

**Table 11-1: Intersection Level of Service, Delay, and Queue Summary
2034 Future Conditions**

Intersection and Type of Control	Movement and Approach	Effective Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR				SATURDAY PEAK HOUR					
			Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)	Delay ¹ (sec/veh)	LOS ¹	SYNCHRO 95th Percentile Queue Length (ft)	SimTraffic Max Queue Length (ft)		
1. US Route 17 (N-S) at Sanford Drive (E) Starstead Drive (W) Signalized	NB Left	135	90.4	F	299	245	112.9	F	#266	245	Not Analyzed in this Peak Hour					
	NB Thru		42.0	D	#1288	554	30.2	C	772	543						
	NB Right	350	12.4	B	119	266	5.3	A	12	181						
	NB Approach		41.3	D	--	--	30.5	C	--	--						
	SB Left	400	123.9	F	#159	144	53.6	D	m150	286						
	SB Thru-Right		3.6	A	68	349	11.1	B	211	386						
	SB Approach		6.1	A	--	--	12.1	B	--	--						
	EB Left-Thru		162.9	F	#162	127	86.6	F	114	702						
	EB Right		55.9	E	31	133	70.9	E	234	375						
	EB Approach		89.0	F	--	--	72.8	E	--	--						
	WB Left	150	142.9	F	#279	461	99.6	F	#435	627						
	WB Thru		164.6	F	#342	602	64.5	E	65	574						
	WB Right	150	76.8	E	0	265	64.2	E	13	189						
	WB Approach		141.9	F	--	--	92.0	F	--	--						
	Overall			36.3	D	--	--	30.1	C	--		--				
2. US Route 17 (N-S) at Hardee's Entrance (E) McLane Drive (W) Signalized	NB Left	350	92.6	F	m40	126	65.3	E	m13	130	Not Analyzed in this Peak Hour					
	NB Thru		46.7	D	m#573	783	9.2	A	288	750						
	NB Right		0.0	A	m0	99	1.2	A	m0	92						
	NB Approach		46.5	D	--	--	9.3	A	--	--						
	SB Left	400	115.4	F	m0	22	0.0	A	m39	0						
	SB Thru-Right		0.7	A	18	112	0.7	A	0	177						
	SB Approach		0.8	A	--	--	0.7	A	--	--						
	EB L-T-R		88.6	F	62	88	78.8	E	41	73						
	EB Approach		88.6	F	--	--	78.8	E	--	--						
	WB L-T-R		84.6	F	53	103	84.4	F	107	138						
	WB Approach		84.6	F	--	--	84.4	F	--	--						
Overall			29.4	C	--	--	5.7	A	--	--						
3. US Route 17 (N-S) at VDOT Commuter Lot (E) Falls Run Drive (W) Signalized	NB Left	350	62.3	E	m148	161	114.3	F	#406	494	137.0	F	#456	545		
	NB Thru		26.4	C	#1635	348	15.8	B	495	550	22.2	C	676	2274		
	NB Right		1.4	A	m0	111	13.2	B	m0	260	9.9	A	0	116		
	NB Approach		28.1	C	--	--	30.0	C	--	--	43.5	D	--	--		
	SB Left	400	138.9	F	m46	88	99.6	F	m112	400	70.8	E	83	399		
	SB Thru		29.4	C	1056	444	68.7	E	m#1367	719	121.2	F	#1364	2150		
	SB Right		12.2	B	m0	124	18.1	B	m0	375	15.2	B	0	375		
	SB Approach		30.6	C	--	--	68.6	E	--	--	119.1	F	--	--		
	EB Left-Thru		118.5	F	#157	131	147.4	F	#659	682	175.5	F	#499	729		
	EB Right	200	82.5	F	6	140	63.0	E	86	646	57.2	E	46	716		
	EB Approach		93.7	F	--	--	108.6	F	--	--	117.0	F	--	--		
	WB Left	400	139.6	F	#90	98	103.8	F	#166	320	69.6	E	74	138		
	WB Left-Thru		139.6	F	#89	92	105.4	F	#170	260	69.6	E	74	101		
	WB Right	200	86.3	F	0	57	80.6	F	0	161	66.4	E	0	94		
	WB Approach		118.9	F	--	--	96.2	F	--	--	68.3	E	--	--		
	Overall			32.2	C	--	--	55.8	E	--	--	84.9	F	--	--	
4. US Route 17 (N-S) at Powell Lane (E) Unsignalized	NB Thru		t	t	--	--	t	t	--	--	Not Analyzed in this Peak Hour					
	NB Right		t	t	--	--	t	t	--	--						
	NB Approach		t	t	--	--	t	t	--	--						
	SB Thru		t	t	--	--	t	t	--	--						
	SB Approach		t	t	--	--	t	t	--	--						
EB Right		11.4	B	7	97	10.1	B	4	85							
EB Approach		11.4	B	--	--	10.1	B	--	--							
5. US Route 17 (N-S) at Commerce Parkway (E) Plantation Drive (W) Signalized	NB Left	200	84.1	F	m113	449	74.9	E	m72	355	Not Analyzed in this Peak Hour					
	NB Thru		62.0	E	m#1680	706	44.9	D	m#873	660						
	NB Right		8.4	A	m18	278	11.3	B	m16	318						
	NB Approach		60.2	E	--	--	42.8	D	--	--						
	SB Left	100	95.2	F	m#69	150	79.5	E	m#157	415						
	SB Thru		20.5	C	m#1135	426	6.2	A	177	517						
	SB Right		14.0	B	m0	27	0.3	A	m0	39						
	SB Approach		22.8	C	--	--	10.3	B	--	--						
	EB Left	420	85.3	F	71	45	85.8	F	113	94						
	EB Left-Thru		85.3	F	72	116	85.6	F	118	889						
	EB Right	200	82.0	F	0	69	80.5	F	34	240						
	EB Approach		83.4	F	--	--	82.6	F	--	--						
	WB Left	50	89.5	F	206	196	153.0	F	#360	435						
	WB Thru		87.8	F	202	197	148.5	F	#357	446						
WB Right	200	73.7	E	0	141	75.3	E	26	281							
WB Approach		84.4	F	--	--	126.6	F	--	--							
Overall			47.5	D	--	--	37.3	D	--	--						
6. US Route 17 (N-S) at McWhirt Loop (E) Lichfield Road (W) Signalized	NB Left	400	52.0	D	m60	117	65.1	E	m46	105	Not Analyzed in this Peak Hour					
	NB Thru		41.3	D	m74	383	18.4	B	m565	304						
	NB Right		0.0	A	m0	22	13.5	B	m0	37						
	NB Approach		40.4	D	--	--	19.5	B	--	--						
	SB Left	400	166.1	F	#385	359	90.8	F	#368	359						
	SB Thru		23.4	C	671	546	15.9	B	582	592						
	SB Right		11.4	B	0	17	7.5	A	0	44						
	SB Approach		33.5	C	--	--	21.8	C	--	--						
	EB Left-Thru		201.4	F	#285	379	81.1	F	110	230						
	EB Right	200	80.7	F	0	210	81.6	F	137	205						
	EB Approach		151.4	F	--	--	81.5	F	--	--						
	WB Left		184.2	F	#240	181	84.3	F	133	159						
	WB Left-Thru		178.3	F	#240	200	84.6	F	136	197						
	WB Right	100	81.9	F	17	191	78.5	E	72	208						
WB Approach		139.1	F	--	--	81.2	F	--	--							
Overall			45.8	D	--	--	26.2	C	--	--						
7. Banks Ford Parkway (N-S) at Celebrate Parkway (E-W) Unsignalized	NB Left-Thru	400	10.7	B	5	52	13.3	B	22	69	Not Analyzed in this Peak Hour					
	NB Right		8.7	A	3	54	8.7	A	4	50						
	NB Approach		9.7	A	--	--	11.9	B	--	--						
	SB Left-Thru		11.9	B	17	63	17.3	C	41	67						
	SB Right		8.4	A	0	26	8.4	A	0	22						
	SB Approach		11.9	B	--	--	17.0	C	--	--						
	EB Left	400	7.5	A	3	41	7.5	A	3	27						
	EB Thru		t	t	--	--	t	t	--	--						
	EB Right	155	t	t	--	--	t	t	--	--						
	EB Approach		2.4	A	--	--	2.0	A	--	--						
	WB Left	325	7.3	A	0	3	7.4	A	3	26						
WB Thru		t	t	--	--	t	t	--	--							
WB Right	220	t	t	--	--	t	t	--	--							
WB Approach		0.5	A	--	--	2.8	A	--	--							
8. US Route 17 (N-S) at Site Ent. #1 (E) Unsignalized	NB Thru		t	t	--	--	t	t	--	--	Not Analyzed in this Peak Hour					
	NB Right		0.0	A	0	0	0.0	A	0	0						
	NB Approach		t	t	--	--	t	t	--	--						
	SB Thru		t	t	--	--	t	t	--	--						
	SB Approach		t	t	--	--	t	t	--	--						
EB Right		10.2	B	2	48	13.1	B	12	91							
EB Approach		10.2	B	--	--	13.1	B	--	--							
9. US Route 17 (N-S) at Site Ent. #2 (E) Unsignalized	NB Thru		t	t	--	--	t	t	--	--	Not Analyzed in this Peak Hour					
	NB Right		0.0	A	0	0	0.0	A	0	0						
	NB Approach		t	t	--	--	t	t	--							



Belmont Park
 Total Future 2034 Peak Hour Volumes (Plus 6 Scenario)
 Stafford County, Virginia

Figure
 11-1

12 CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses the following is offered:

- Under 2018 existing conditions, each of the study intersections operate at an overall level of service (LOS) D or better in all peak hours. Each of the movements at the intersections also operate at LOS D or better in all peak hours with the exception of the mainline lefts and side-street approaches at the majority of the side street intersections along U.S. Route 17. \
- Under 2018 existing conditions, the queuing results indicate several of the mainline left turning movements along U.S. Route 17 spillback through the available storage in the AM and PM peak hours.
- Under 2018 existing conditions, field observations and experience in the corridor indicate southbound U.S. Route 17 experiences delay and significant queuing in the PM peak hour whenever there is a slow down or incident on I-95 southbound. This delay/queue is related to the I-95 traffic and will be addressed with the I-95 Southbound Rappahannock River Crossing Mega-Project discussed above.
- Under 2023 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.
- Due to the complimentary nature of the uses, the proposed mixed-use development will experience an internal reduction of 5% to 16% in each of the peak hours.
- The proposed development is a complimentary use to the existing VDOT Commuter Lot since the majority of the Commuter Lot trips enter before the AM peak hour and leave prior to the PM peak hour. Further, it is anticipated that up to 10% of the retail traffic associated with the proposed development will come from the Commuter Lot traffic.
- Given the location of the development along a major commuting corridor and adjacent to I-95, it is anticipated that up to 34% of traffic to the retail component of the project will be pass-by trips already on U.S. Route 17 and not new trips to the roadway network.
- With development of Phase 1 of the proposed project in 2023, the operations the majority of the study intersections would experience minimal to no changes in levels of service or queueing compared to background conditions.
- With Phase 1 of the proposed development in 2023, the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection would degrade from an overall LOS C/B/B (AM/PM/Sat peak hours) under background conditions to an overall LOS B/E/F (AM/PM/Sat peak hours). The northbound left turn from U.S. Route 17 into the site will operate at an overall LOS F with queues that extend beyond the available storage. All other site entrances operate at LOS C or better in all peak hours.
- Under 2028 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.

- Under 2028 future conditions (with full buildout of the site), the majority of the study intersections would operate at comparable LOS and queueing to background conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.
- The diversion of site traffic with the Celebrate Virginia Parkway entrance improves the U.S. Route 17/Falls Run Drive/VDOT Commuter Lot intersection. The intersection would operate better under 2028 conditions than under 2023 conditions.
- Under 2034 background conditions, each of the study intersections would operate at comparable LOS to existing conditions. The 95th percentile and maximum queues would increase slightly with the growth in traffic, but no new movements would spill back through the available storage.
- Under 2034 future conditions, the majority of the study intersections would operate at comparable LOS and queueing to 2028 conditions. The 95th percentile and maximum queues would increase slightly with the addition of site traffic, but no new movements would spillback through the available storage at the majority of the intersections.