100/102/112 MAPLE AVENUE EAST
MULTI-MODAL TRANSPORTATION
IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA

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100/102/112 MAPLE AVENUE EAST
MULTI-MODAL TRAFFIC IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA

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EXECUTIVE SUMMARY

PURPOSE OF REPORT & STUDY OBJECTIVES

This report presents the results of a Traffic Impact Analysis (TIA) prepared as part of a rezoning application for a proposed redevelopment in the Town of Vienna, Virginia. The application proposes to redevelop the subject site with a mixed-use building comprised of approximately 85 assisted living units (105 beds) and 8,400 GSF of ground floor retail uses. The purpose of this study is to assess the potential effects of the proposed redevelopment on the surrounding and adjacent transportation network and, where necessary, to identify potential mitigation measures to offset any possible impacts.

The site is currently developed with approximately 10,980 GSF of medical office use. The trips generated by the existing use were compared to the proposed development program to determine VDOT Chapter 870 compliance. According to VDOT Chapter 870 regulations a TIA is required for rezoning (or equivalent) projects that "will substantially affect transportation on state highways" by generating more than 5,000 new vehicle trips per day (vpd). The proposed development would generate fewer than 50 more daily trips over existing conditions and therefore does not require a VDOT Chapter 870 TIA to be submitted. Although the proposed development does not meet the thresholds for VDOT Chapter 870 TIA, it is being prepared consistent with the requirements of the Maple Avenue Commercial District that require submission of a traffic analysis.

SITE LOCATION AND STUDY AREA

The approximate 0.74-acre site is located in the northeast quadrant of the Maple Avenue (Route 123) and Center Street intersection in the Town of Vienna, Virginia. The application area is further identified as Fairfax County 2018 Tax Map 38-4 ((2)) 125A. Due to the site's location, future development of the property is recommended in accordance with the Maple Avenue Commercial ("MAC") Zone as outlined in the Town's Zoning Ordinance. The "MAC" Zone envisions compact mixed use and pedestrian-oriented development.

To inform the scope of this TIA, a study area was agreed to with the Town of Vienna staff at a scoping meeting held with the Town of Vienna on August 8, 2018. The study area is generally bounded by Church Street (Route 6933) to the north, Maple Avenue to the south, and Center Street to the west. Per the approved scoping form, the study area includes three (3) existing study intersections/driveways. Of the three (3) existing study intersections, one (1) is an existing site driveway that will be retained in its general location with the proposed development. The scoping agreement is included herein as Appendix A.

DESCRIPTION OF PROPOSED DEVELOPMENT

The site is currently developed with two partially vacant office buildings totaling approximately 10,980 gross square feet (GSF). Sunrise Senior Living (the "Applicant") proposes to rezone the site from C-2 (General Commercial) to the Maple Avenue Commercial ("MAC") District and redevelop

with a mixed-use building comprised of approximately 85 assisted living units (105 beds) and 8,400 GSF of ground floor retail uses. Access to the site is currently provided via a full movement entrance along Center Street. The existing entrance will be retained in its general location with this application. A full sized plan sheet is provided as Appendix B.

CONCLUSIONS

Based on this assessment, the traffic generated by the proposed mixed-use development will not adversely impact nearby intersections based on the following:

1. The proposed application seeks to rezone and redevelop approximately 0.74 acres with a mixed-use building comprising of approximately 85 assisted living units (105 beds) and 8,400 GSF of ground floor retail uses.

2. Under existing 2018 conditions, the signalized Maple Avenue/Center Street intersection currently operates at an overall level of service (LOS) "C" or better during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections have traffic movements that are LOS "D" or better and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours.

3. Roadway intersections within the study area would experience increases in traffic as a result of background regional growth and future pipeline developments (including the potential development of the Flagship Carwash, Marco Polo Restaurant (Vienna Market), and 444 Maple Avenue sites).

4. Under 2021 background conditions (build out of the future conditions without the proposed mixed-use development), the signalized Maple Avenue/Center Street study intersection would continue to operate at overall LOS "C" or better during the weekday AM and PM and Saturday peak hours consistent with existing conditions All the STOP controlled intersections have traffic movements that are LOS "D" or better and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours consistent with existing conditions.

5. According to the Institute of Transportation Engineers (ITE) 10th Edition *Trip Generation Manual*, the proposed mixed-use development is anticipated to generate approximately 25 weekday AM peak hour net new external trips, 37 weekday PM peak hour net new external trips, 36 Saturday peak hour net new external trips, and 379 daily (24-hour) net new external trips. These site trips include an internal allowance reduction between the assisted living and retail components, as well as a pass-by reduction for the retail component.

6. Under 2021 total future conditions (build out of the future conditions with the proposed mixed-use development), the signalized Maple Avenue/Center Street study intersection would continue to operate at overall LOS "C" during the weekday AM, weekday PM, and Saturday peak hours consistent with background future levels of service. All the STOP controlled intersections have traffic movements that are LOS "D" or better with the exception of the Westbound approach which degrades by one (1) second to LOS "E" and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours consistent with background conditions.

7. The existing, background and future analysis scenarios indicate that the weekday AM, PM and Saturday peak hour vehicle queues would be accommodated within existing turn lane bays.

RECOMMENDATIONS

The results of the analysis summarized above indicate negligible impacts to intersection operations within the study area. However, in order to address the minimal net trips generated by the proposed mixed-use development, the following are recommended:

1. The Applicant should promote the pedestrian oriented and mixed-use characteristics of the development by establishing a quality streetscape with pedestrian amenities. Guidance will be provided by the approved pedestrian master plan and Maple Avenue Corridor (MAC) Zone guidelines. These include; wide sidewalks meeting the MAC's recommended width, improved bus stops located along the frontage, and enhancing the walking experience through design elements (e.g. landscaping, street furniture, public art and/or wayfinding).

2. The Applicant should implement certain elements of a Transportation Demand Management (TDM) program in order to further reduce the forecasted peak hour trips for this project, encourage transit related, non-auto modes of travel, and take advantage of the site's proximity to transit service.

3. The Town of Vienna promotes and encourages bicycling as an environmentally and healthy way to get around town and was designated as a Bicycle Friendly Community by the League of American Bicyclists. The Applicant should evaluate incorporating short term bike parking into the site design as appropriate and feasible.

SECTION 1

INTRODUCTION

PURPOSE

In 2006, the Virginia General Assembly approved legislation (Senate Bill 699, Chapter 527 of the 2006 Acts of Assembly) to enhance the coordination of land use and transportation planning in the Commonwealth. All development proposals which meet certain specific trip generation thresholds are subject to the regulations as outlined in VDOT's Traffic Impact Analysis Regulations Administrative Guidelines dated November 2014 (the "Administrative Guidelines"). An amendment to the legislation took effect in January 2012. Based on the legislative updates (now referred to as Chapter 870), a development proposal is generally considered to substantially impact the transportation network if it generates more than 5,000 daily vehicle trips. Based on a review of the Applicant's proposed development plan, a Chapter 870 compliant TIA is not required; however, this study is prepared to comply with the requirements of the Maple Avenue Commercial District.

Therefore, the purpose of this report is to assess any traffic related impacts associated with the subject rezoning application. To that end, representatives of the development team met with the Town of Vienna to identify the study scope and agree on specific study parameters. A copy of the scoping agreement is included in Appendix A.

STUDY OBJECTIVES

The objectives of this assessment were to:

1. Evaluate baseline weekday AM, PM and Saturday peak hour traffic conditions (year 2018).
2. Provide an analysis of weekday AM, PM and Saturday peak hour traffic conditions without the build out of the mixed-use development and including background pipeline developments (year 2021).
3. Provide an analysis of weekday AM, PM and Saturday peak hour traffic conditions with build out of the proposed new mixed-use development (year 2021).
4. Identify development-related traffic impacts associated with the proposed new development, if any.

Utilizing a five-step process consisting of removing trips associated with the existing uses, adding regional traffic growth, estimating the trip generation associated with approved and proposed developments, trip distribution, and traffic assignment; future conditions were forecasted and intersections were evaluated in terms of levels of service and queuing. Appropriate mitigation measures were then identified and evaluated to remediate impacted levels of service, where applicable.

This study was conducted in general accordance with the 24 VAC 30-155-60 regulations. Sources of

data for this analysis included traffic counts conducted by Wells + Associates, VDOT, the Institute of Transportation Engineers (ITE), the Town of Vienna, Sunrise Senior Living, Walter L. Phillips, Inc., the Highway Capacity Manual 2010 (as reported by Synchro version 10.1), and the files and libraries of Wells + Associates.

Tasks undertaken in this study included the following:

1. Reviewed the Applicant's proposed plans and other background data.

2. Conducted a field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.

3. Participated in a Scope of Work meeting with Town of Vienna staff, and the project team to establish the study scope and specific analysis parameters.

4. Conducted traffic counts at the study intersections during the weekday AM, PM and Saturday peak periods.

5. Analyzed existing 2018 levels of service and vehicle queues at each of the key study intersections during the weekday AM, PM and Saturday peak hours.

6. Estimated the number of weekday peak hour trips that would be generated by nearby, but unbuilt developments (i.e. pipeline projects).

7. For year 2021, forecasted background future traffic volumes (without the proposed development) based on baseline traffic counts, regional traffic growth, and pipeline development trip assignments.

8. Calculated weekday AM, PM and Saturday peak hour background (without the proposed residential development) levels of service and vehicle queues at each of the key study intersections for year 2021 based on background traffic forecasts and the improved signal cycle length and coordination plans as provided by the Town.

9. Estimated the number of weekday AM, PM and Saturday peak hour trips that would be generated by build-out of the proposed development based on standard Institute of Transportation Engineers (ITE) 10th edition, Trip Generation Manual rates and/or equations.

10. Removed the existing driveway trips from the site driveways based on actual traffic counts.

11. Prepared weekday AM, PM and Saturday peak hour total future traffic forecasts based on background traffic forecasts, the removed existing site trips, and with the proposed mixed-use development site traffic assignments with applicable internal capture and pass-by reductions for the assumed build out year of 2021.

12. Calculated weekday AM, PM and Saturday peak hour total future levels of service and vehicle queues for each of the key study intersections based on projected total future traffic forecasts, existing/future traffic controls, and intersection geometries for 2021.

13. Identified network improvements and/or transportation enhancements required to

accommodate future traffic volumes with the proposed new uses.

STUDY METHODOLOGY

Synchro software (version 10.1) was used to evaluate levels of service at the study intersections during the weekday AM, PM and Saturday peak hours. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized intersections analyzed herein were taken from the Highway Capacity Manual 2010 (HCM) reports generated by Synchro version 10.1. Level of service descriptions are included in Appendix C. Current signal timing/phasing data were obtained from the Town of Vienna and incorporated in the base Synchro model in accordance with typical VDOT parameters, as appropriate.

STUDY AREA

This study was conducted in accordance with the parameters set forth in the August 2018 scoping document included in Appendix A that was agreed to by the Town of Vienna and the Applicant's representatives. The study area was selected based on those intersections potentially affected by the proposed mixed-use development. The study area/site location is shown on Figure 1-1.

For purposes of this analysis, the following intersections/locations are included in the study area:

1. Maple Avenue/Center Street
2. Church Street/Center Street
3. Center Street/Site Entrance

Figure 1-2 depicts the location of the study intersections.

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Figure 1-1
Site Area/Site Location Map

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

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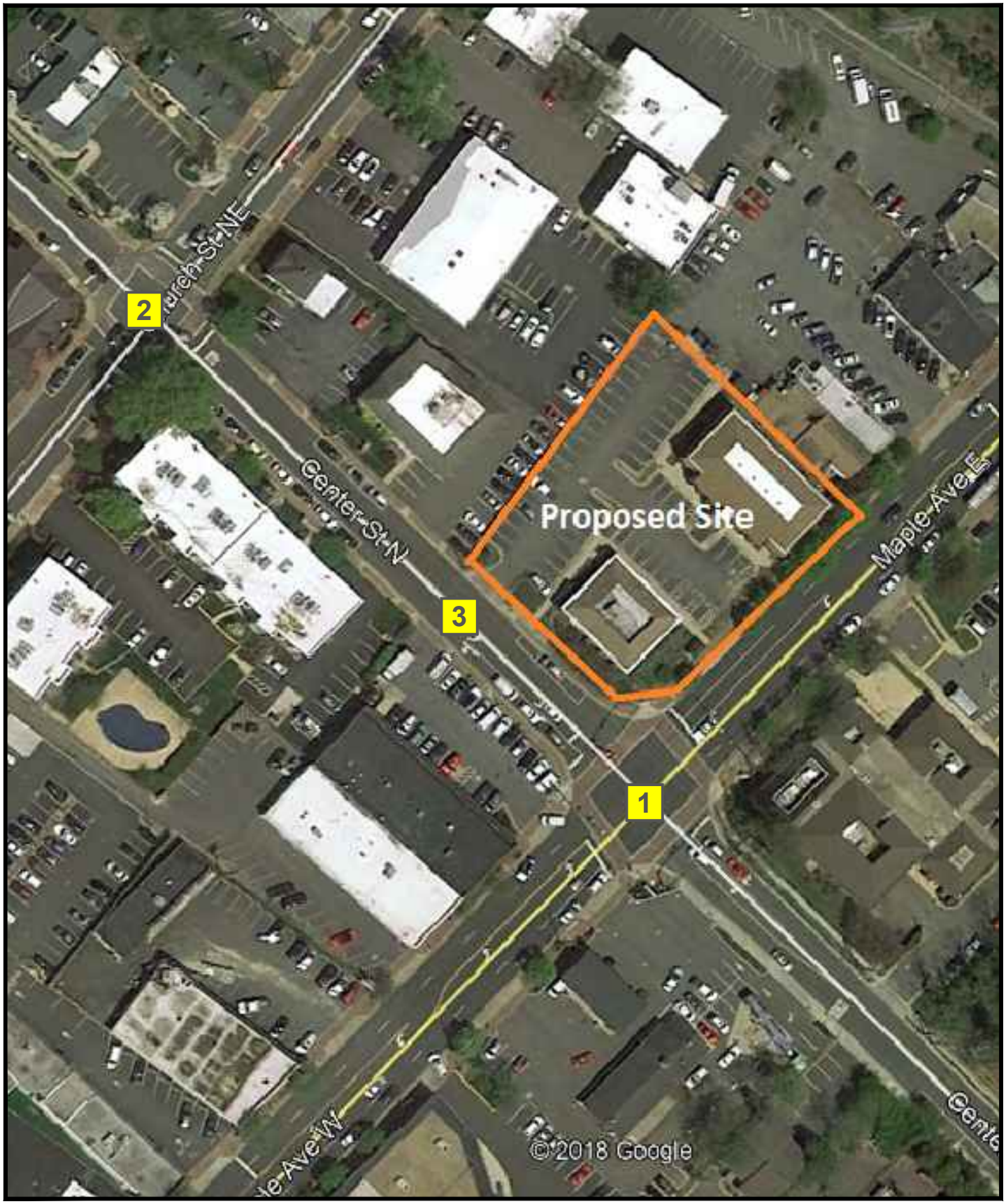


Figure 1-2
Study Intersections

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

SECTION 2

BACKGROUND INFORMATION

SITE LOCATION/DESCRIPTION

Overview. The approximate 0.74-acre site is located in the northeast quadrant of the Maple Avenue (Route 123) and Center Street intersection in the Town of Vienna, Virginia. The application area is further identified as Fairfax County 2018 Tax Map 38-4 ((2)) 125A**.**

Project Description. The Applicant is proposing to develop the site with a mixed-use building comprised of approximately 85 assisted living units (105 beds) and 8,400 GSF of ground floor retail uses. The site is currently developed with two partially vacant office buildings totaling approximately 10,980 gross square feet (GSF) of medical office use. All of the existing buildings will be razed and redeveloped according to the Applicant's plan.

Site Access. Vehicular access to the subject property is currently provided via a full movement entrance along Center Street. The existing access would remain in its general location with the proposed application. A reduction of the proposed MAC Rezoning Plan is provided on Figure 2-1. A full-size copy of the Plan layout is included as Appendix B.

Terrain. The terrain proximate to and surrounding the site is generally classified as "level".

Existing Zoning. The site is currently zoned C-2 (General Commercial), Figure 2-2 depicts the existing zoning associated with the subject site, as well as neighboring properties, all as reflected on Fairfax County's 2018 zoning map.

Surrounding Land Uses and Zoning. As shown on Figure 2-2, the properties immediately adjacent to the subject site are zoned as follows:

- C-1 (Local Commercial) immediately to the north and east
- C-2 (General Commercial) across Center Street to the west and across Maple Avenue to the south

COMPREHENSIVE PLAN

Due to the site's location, future development of the property is recommended in accordance with the Maple Avenue Commercial ("MAC") Zone as outlined in the Town's Zoning Ordinance. The "MAC" Zone envisions compact, mixed-use and pedestrian oriented development.

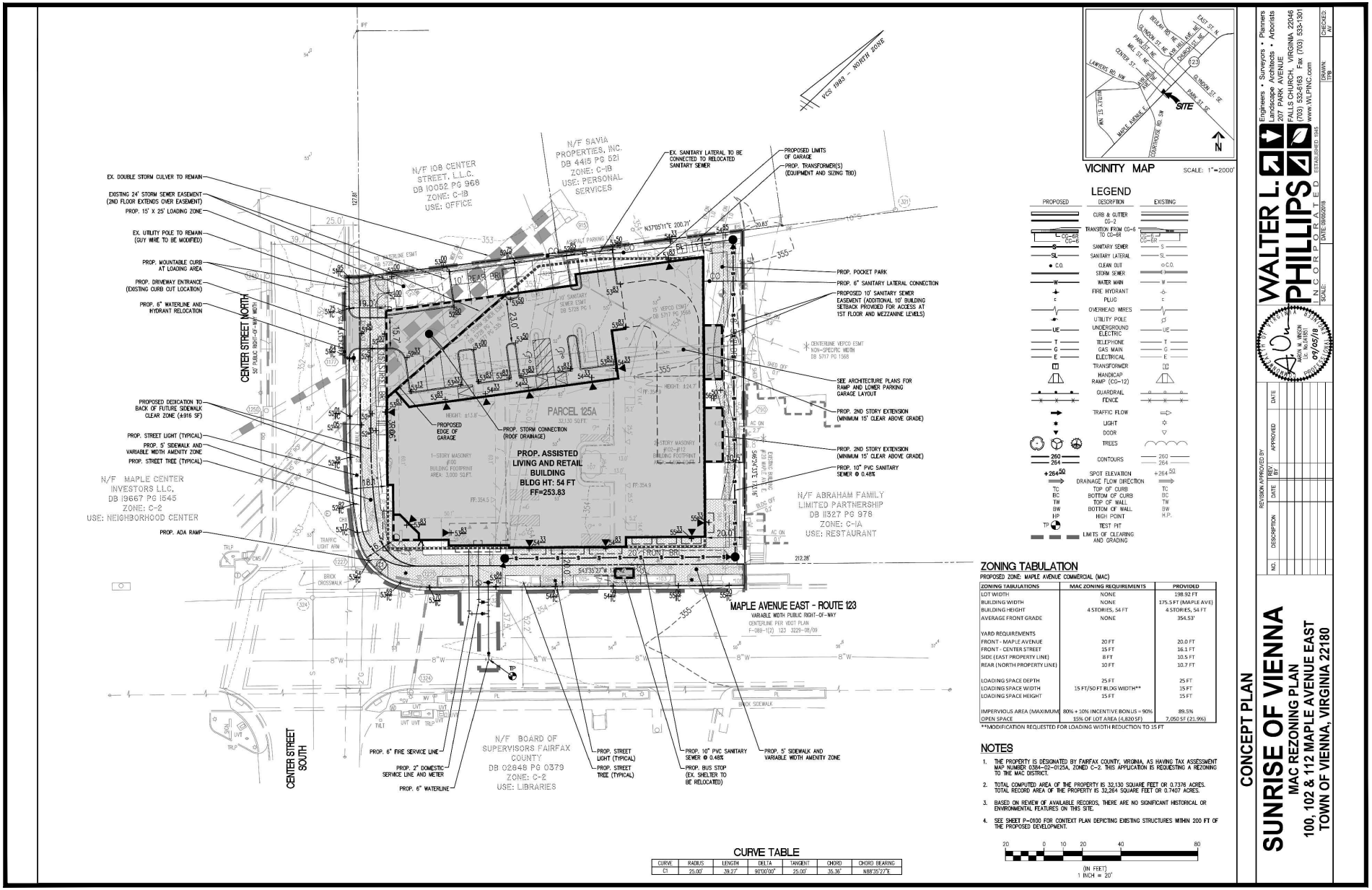


Figure 2-1
MAC Rezoning Plan Layout

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

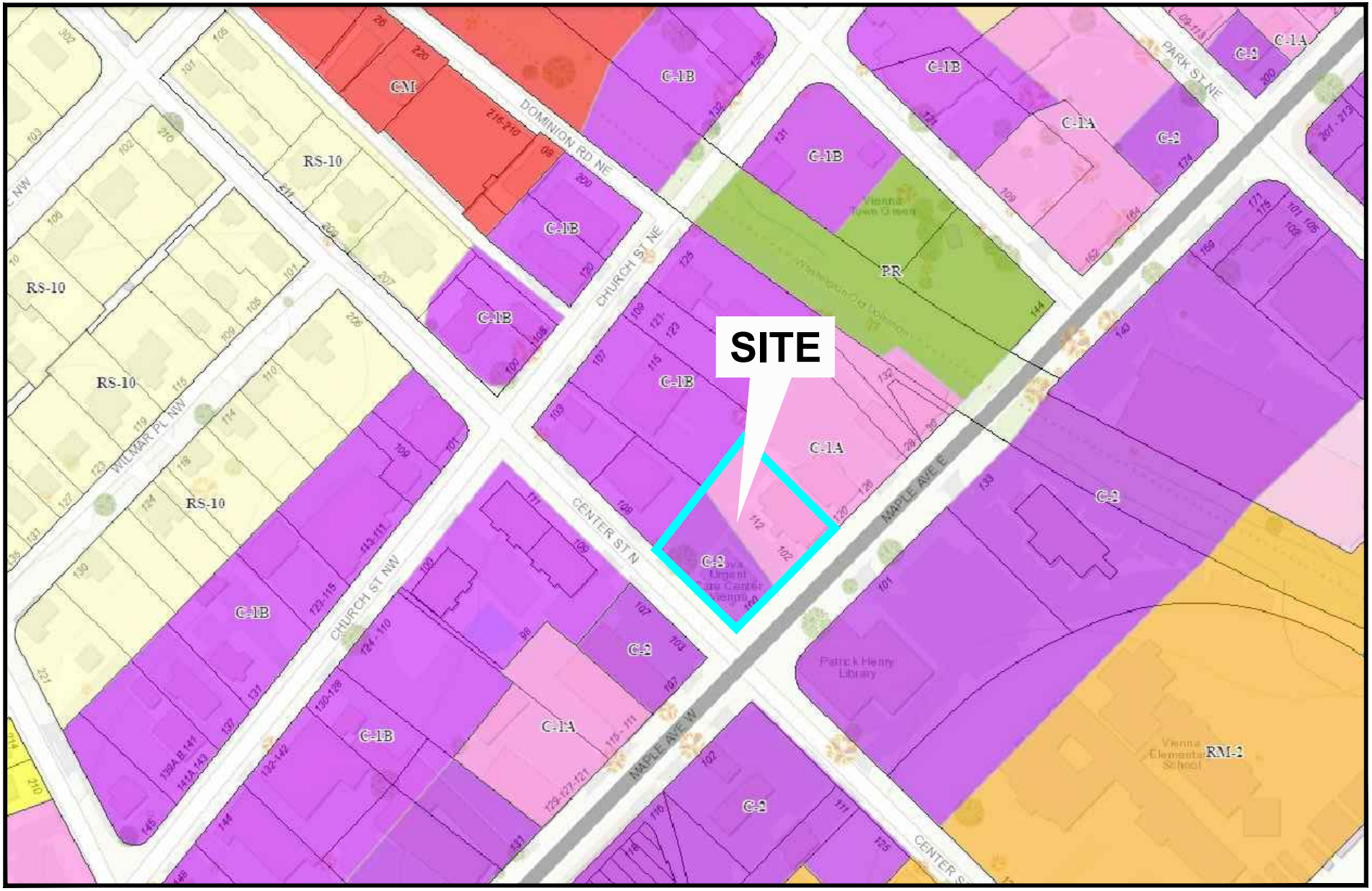


Figure 2-2
Existing Zoning Map

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

ROADWAY NETWORK

Existing Roadway Network.

Maple Avenue (Route 123) is a four-lane, Urban Principal Arterial with a posted speed limit of 30 mph adjacent to the site. Maple Avenue in the area of the site carries 30,000 average daily trips according to 2017 VDOT traffic data. The Maple Avenue/Center Street intersection operates under traffic signal control. A center left turn lane is generally provided along Maple Avenue. No exclusive right turn lanes are provided.

Church Street (Route 6933) is a two-lane, undivided, Major Collector with a posted speed limit of 25 mph. Church Street in the area of the site carries 6,000 average daily trips according to 2017 VDOT traffic data.

Center Street is a two-lane, undivided, Local Street with a posted speed limit of 25.

Existing lane use and traffic control at key intersections in the site vicinity are shown on Figure 2-3.

TRANSIT FACILITIES

Existing Transit Services. The site is located approximately two miles from the Vienna/Fairfax-GMU Metrorail station (Orange Line). The immediate area is served by Fairfax Connector bus routes. A bus stop is located directly adjacent to the site on Maple Avenue. Figure 2-4 locates existing bus stops/shelters adjacent and proximate to the property. A description of the bus service lines serving the site and the surrounding area is provided below:

Fairfax Connector 461 (Flint Hill – Tapawingo - Vienna). Fairfax Connector 461 provides weekday rush hour service circulating between Vienna Metro Station, Chain Bridge Road/James Madison Drive, Lawyers Road/Lewis Street, and Park Street/Moore Avenue. Headways are typically 20 to 30 minutes. Additional route information is provided in Appendix D.

Fairfax Connector 463 (Maple Avenue - Vienna). Fairfax Connector 463 provides weekday, Saturday and Sunday service between Vienna Metro Station (north side) and Tysons Corner Metro Station (south side). Major stops include Maple Avenue/Courthouse Road, Maple Avenue/Beulah Road, and Chain Bridge Road/Horse Shoe Drive. Headways are typically 20 to 30 minutes. Additional route information is provided in Appendix D.

A review of the bus timetables, as provided in Appendix D, shows that bus users from the site during the peak periods that were analyzed, would have to wait for a bus on the range of 1 minute to 18 minutes during the AM and PM peak hours and an hour on the weekends. According to the timetables, bus trips from the vicinity of the site take approximately 8 minutes to arrive at the Vienna Metrorail Station.

PEDESTRIAN/BICYCLE FACILITIES

Existing Facilities. The subject site is located in an area with connected sidewalks along both sides on Maple Avenue at the signalized intersection of Maple Avenue/Center Street crosswalks with pedestrian countdown signal heads are provided on all legs of the intersection. In the vicinity of the site BikeFairfax identifies Center Street as the preferred bicycle route. The site is also in close proximity to the Washington and Old Dominion (W&OD) Trail.

The existing pedestrian and bicycle facilities (including transit stops) within the study area are depicted on Figures 2-5 and 2-6, respectively.

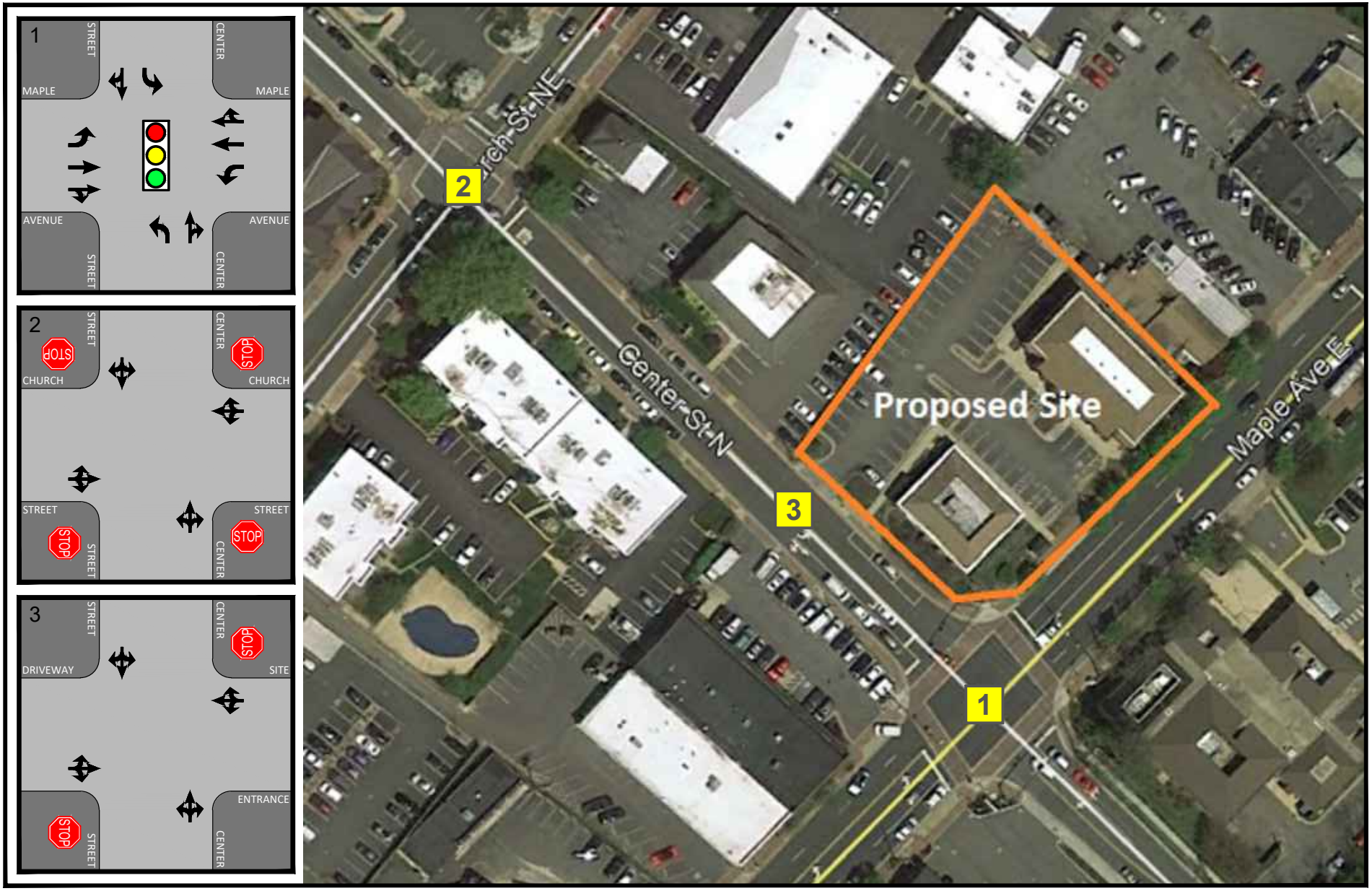


Figure 2-3
Existing Lane Use and Traffic Controls

Represents One Travel Lane
Signalized Intersection
Stop Sign

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

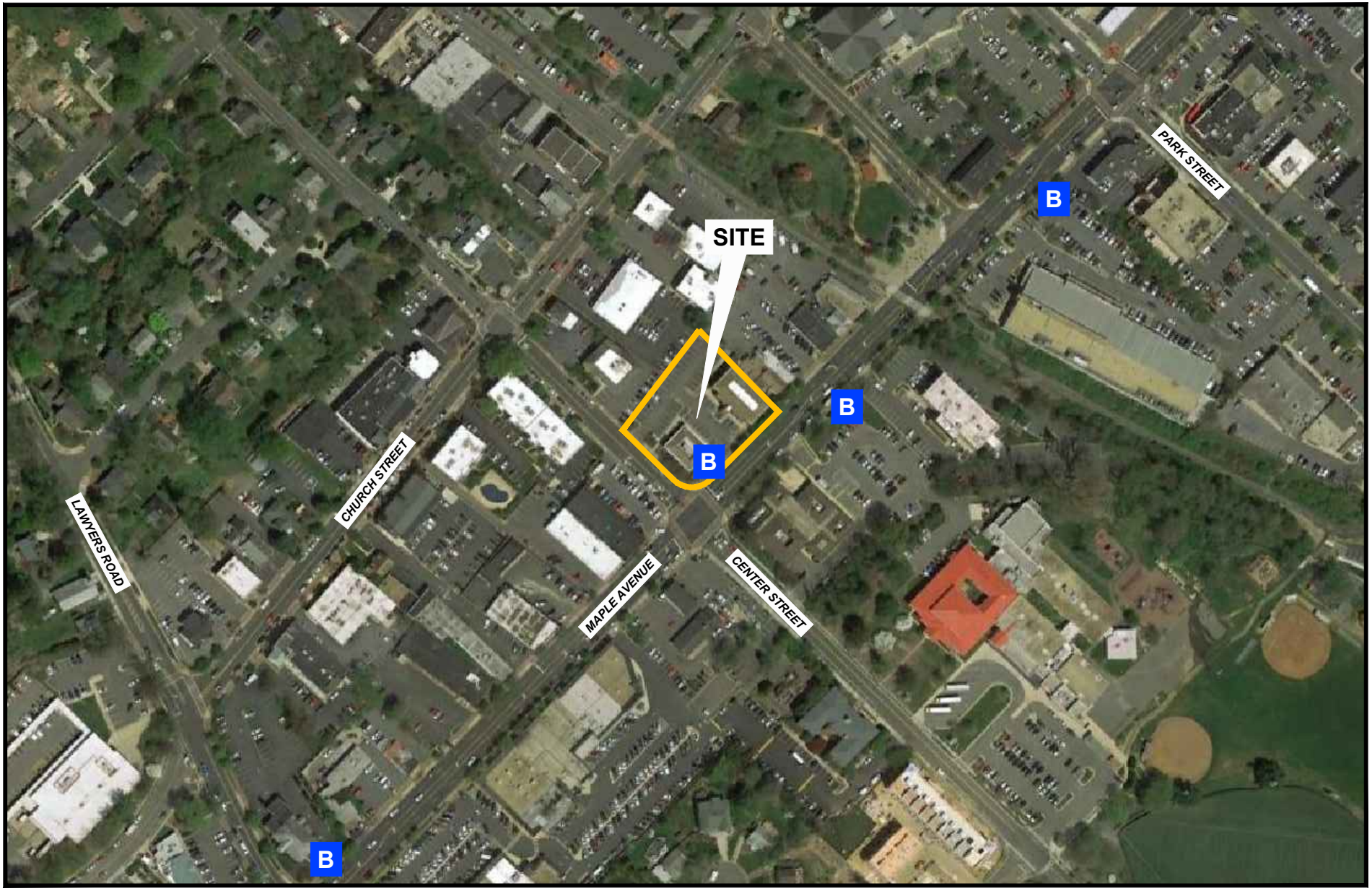


Figure 2-4
Existing Bus Stops/Shelters

B **Bus Stop/Shelter**

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

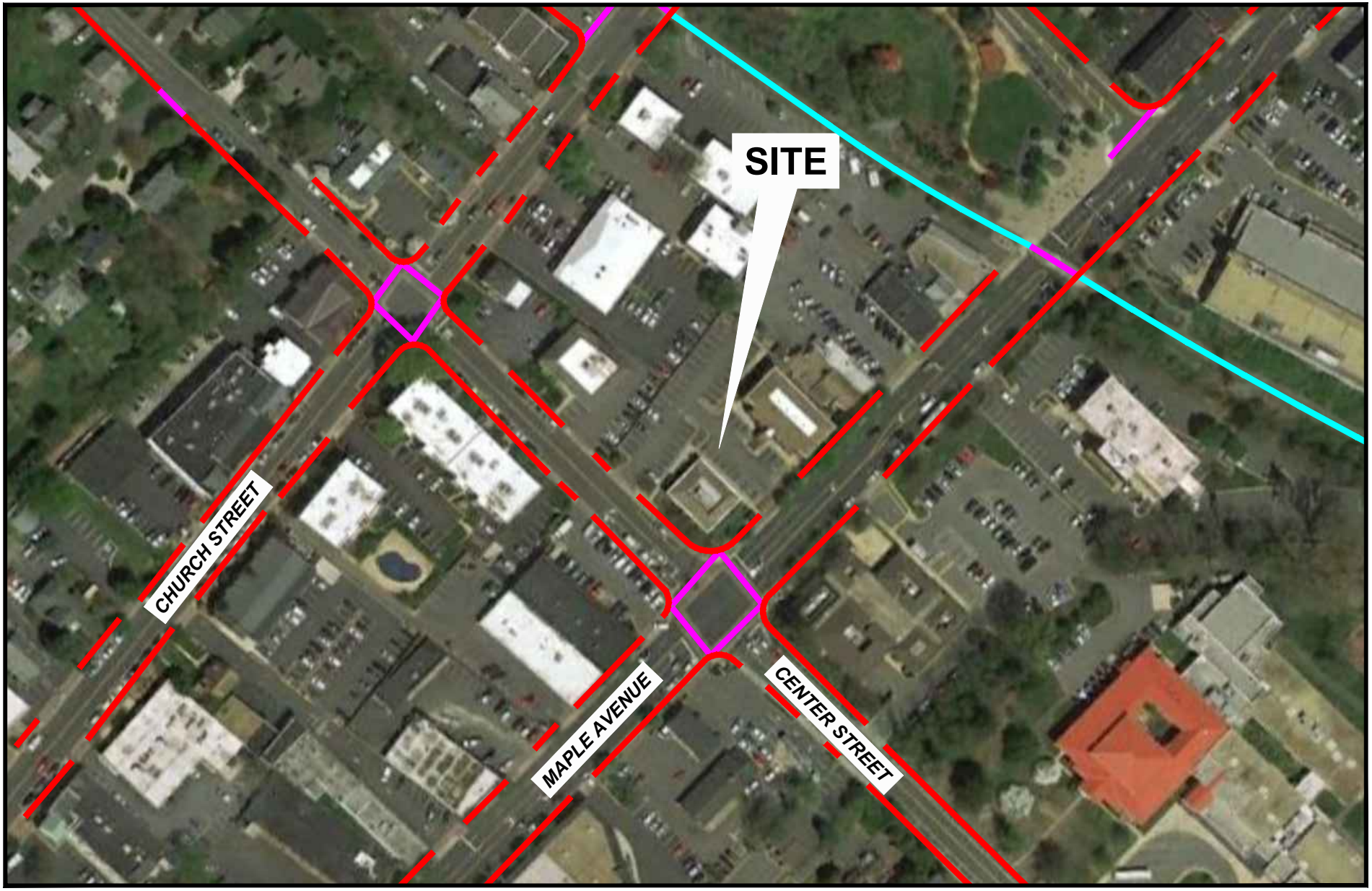


Figure 2-5
Existing Pedestrian Facilities

Sidewalk
Marked Crosswalk
W & OD Trail

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

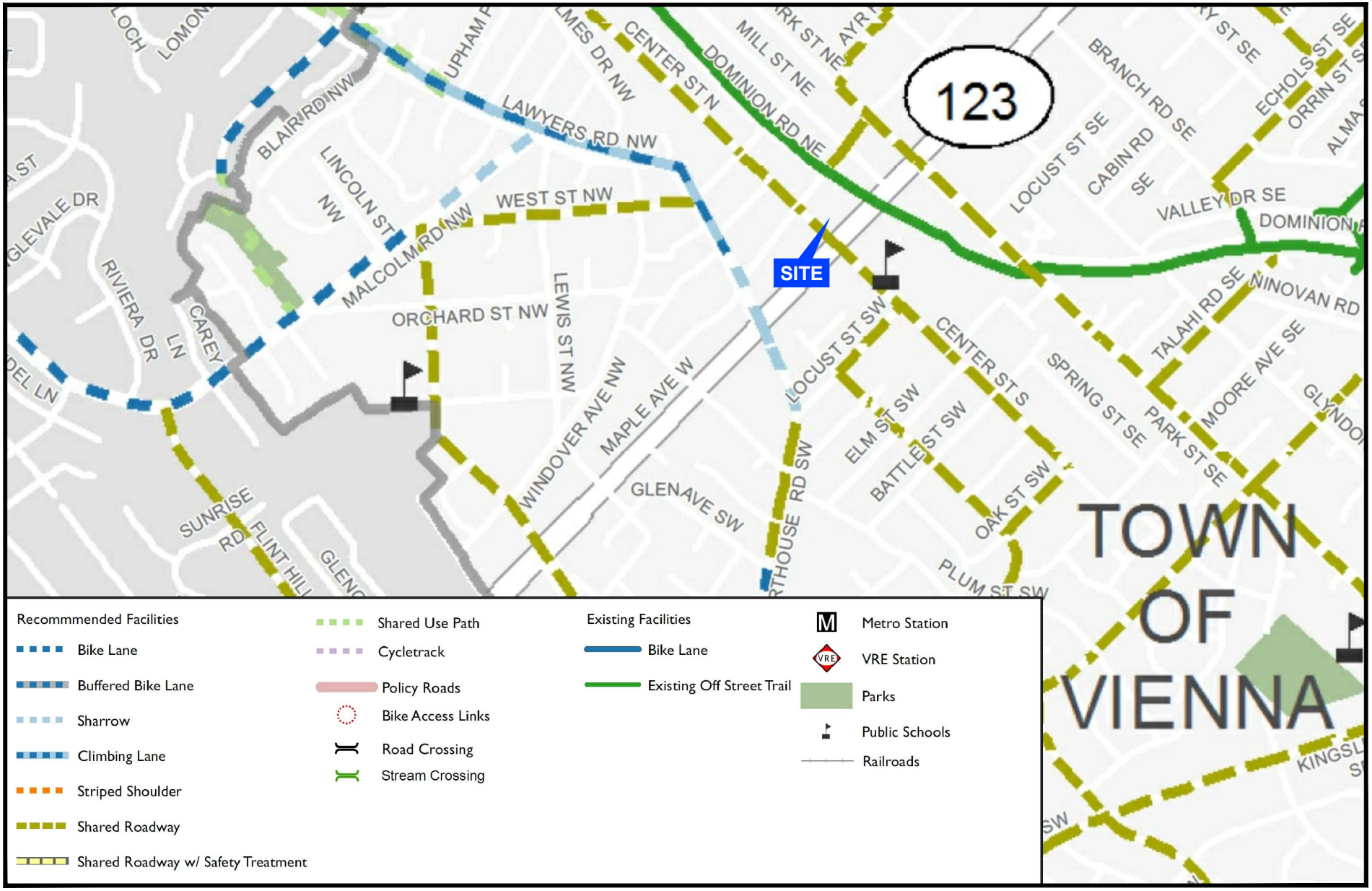


Figure 2-6
Existing and Reccommended Bicycle Facilities

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

SECTION 3

ANALYSIS OF EXISTING CONDITIONS

TRAFFIC VOLUMES

Wells + Associates (W+A) conducted weekday AM, PM and Saturday peak period vehicular, pedestrian, and bicycle traffic counts at the following locations:

1. Maple Avenue/Center Street
2. Church Street/Center Street
3. Center Street/Site Entrance

Traffic counts were conducted on Tuesday, August 28, 2018 and Saturday September 8, 2018 for all the study intersections listed above. Traffic counts were conducted between the hours of 6:00 AM - 10:00 AM and 3:00 PM - 7:00 PM for the weekday and 10:00 AM – 3:00 PM for Saturday and recorded in 15-minute intervals.

The individual peak hour traffic was evaluated for each intersection and then balanced between intersections where applicable and in accordance with standard practice (i.e., if driveways exist between intersections, those intersections were not balanced). Copies of the count data are included as Appendix E. The weekday AM, PM and Saturday peak hour traffic volumes are summarized on Figure 3-1. The corresponding pedestrian and bicycle counts at each location are summarized on Figure 3-2 and Figure 3-3 respectively.

OPERATIONAL ANALYSIS

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic controls shown on Figure 2-3, existing 2018 baseline vehicular traffic volumes shown on Figure 3-1, existing traffic signal timings obtained from the Town of Vienna, and the methodology outlined in the Highway Capacity Manual 2010 as reported by Synchro version 10.1. Descriptions of level of service are provided in Appendix C for signalized and unsignalized locations. The capacity analysis results as reported by Synchro are presented in Appendix F and summarized in Table 3-1 and on Figure 3-4.

Results. The results of the existing intersection capacity analyses indicate the signalized Maple Avenue/Center Street intersection currently operates at an overall level of service (LOS "C" or better) during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections have traffic movements that are "D" or better and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours.

QUEUING ANALYSIS

A queuing analysis was conducted for existing conditions at the study intersections to establish a datum against which to compare future conditions. Synchro was used to conduct the analyses, using the average queue for thru movements and the 95th percentile queue lengths for turning movements. The 95th percentile queue is defined as the maximum back of queue with 95th percentile traffic volumes. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations. The queuing results are summarized in Table 3-2. Queue reports are also provided in Appendix F. As shown on Table 3-2, all 95th percentile queues are contained within the available effective storage in the existing condition.



Figure 3-1
Existing Peak Hour Traffic Volumes

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia



Figure 3-2
Existing Peak Hour Pedestrian Volumes

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia



Figure 3-3
Existing Peak Hour Bicycle Volumes

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 3-1
100/102/112 Maple Avenue East
Existing Intersection Levels of Service Summary (1) (2) (3)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2018 AM	PM	SAT
1 **Center Street**/Maple Avenue	Signal		EBL	B (13.7)	B (17.1)	C (20.4)
		Maple Avenue	EBT	C (22.5)	B (17.3)	C (26.8)
			EBTR	C (22.4)	B (17.3)	C (26.7)
			WBL	B (16.0)	B (12.4)	B (19.2)
		Maple Avenue	WBT	B (18.1)	C (22.7)	C (27.5)
			WBTR	B (18.0)	C (22.7)	C (27.5)
		Center Street	NBL	D (49.3)	E (58.2)	D (45.7)
			NBTR	E (64.5)	F (93.6)	E (62.0)
		Center Street	SBL	D (46.8)	E (57.2)	D (44.3)
			SBTR	D (54.8)	F (101.2)	D (50.9)
			Overall	**C (28.4)**	**C (34.8)**	**C (31.5)**
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	C [16.2]	B [14.6]	C [17.2]
		Church Street	WBLTR	B [12.3]	D [31.7]	C [15.3]
		Center Street	NBLTR	B [10.7]	C [15.9]	B [13.9]
		Center Street	SBLTR	B [14.1]	B [12.9]	B [11.8]
3 **Center Street**/Site Driveway	STOP	Driveway	EBLTR	B [11.8]	B [12.4]	B [12.9]
		Site Entrance	WBLTR	A [0.0]	B [14.6]	B [11.7]
		Center Street	NBLTR	A [8.1]	A [8.0]	A [8.1]
		Center Street	SBLTR	A [0.0]	A [0.0]	A [0.0]

Notes (1) Numbers in parentheses ( ) represent delay at signalized intersections in seconds per vehicle.
(2) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
(3) Roadway names in bold are considered north/south for purposes of this analysis

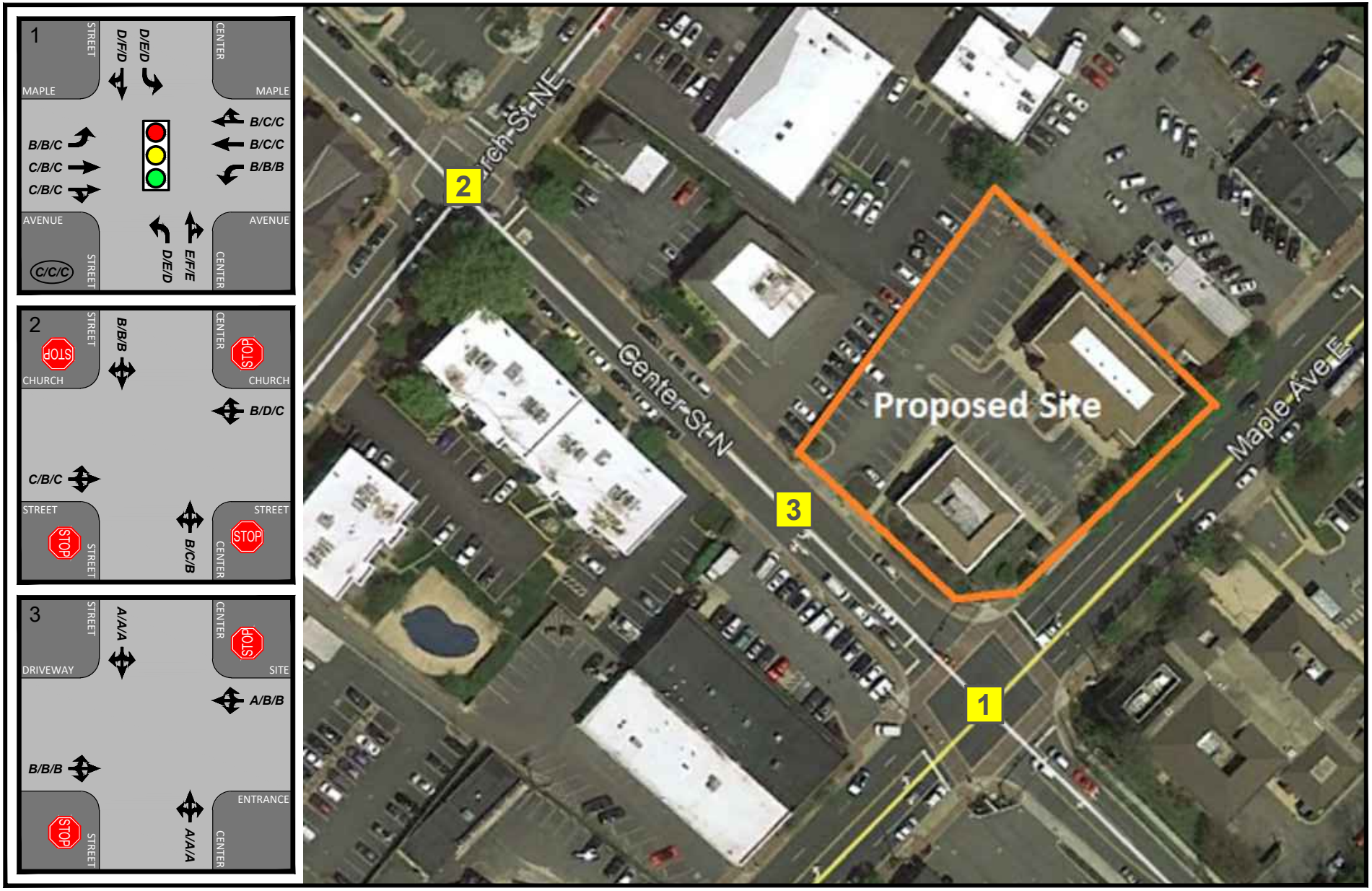


Figure 3-4
Existing Levels of Service Results

Represents One Travel Lane
Signalized Intersection
Stop Sign

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 3-2
100/102/112 Maple Avenue East
Existing Intersection Queuing Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage (ft)	Existing 2018 AM	PM	SAT
1 **Center Street**/Maple Avenue	Signal	Maple Avenue	EBL	140	22	33	53
			EBTR	-	476	331	547
		Maple Avenue	WBL	200	43	37	40
			WBTR	-	282	597	562
		Center Street	NBL	100	67	73	62
			NBTR	-	160	361	217
		Center Street	SBL	-	160	99	138
			SBTR	-	232	378	191
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	-	98	60	103
		Church Street	WBLTR	-	40	220	75
		Center Street	NBLTR	-	20	68	58
		Center Street	SBLTR	-	63	30	25
3 **Westbranch Drive**/Jones Branch Drive	STOP	Driveway	EBLTR	-	5	3	5
		Site Entrance	WBLTR	-	0	0	0
		Center Street	NBLTR	-	0	0	0
		Center Street	SBLTR	-	0	0	0

Notes (1) Turning movement queue length is based on the 95th percentile queue as reported by Synchro, Version 10.
(2) Roadway names in bold are considered north/south for purposes of this analysis

SECTION 4

2021 ANALYSIS OF FUTURE (BACKGROUND) CONDITIONS WITHOUT PROPOSED DEVELOPMENT

METHODOLOGY

Weekday AM, PM and Saturday peak hour future traffic forecasts without the proposed development were developed based on a composite of existing baseline traffic volumes, increases in traffic associated with regional growth, and increases in traffic associated with other not yet constructed (pipeline) developments. This methodology was discussed with VDOT and Town staff as reflected in the signed scoping agreement in Appendix A.

REGIONAL GROWTH

As agreed to in the scoping documentation, increases in traffic associated with regional growth was recommended by Town staff to be 1.0 percent per year compounded for movements along Maple Avenue, Center Street, and Church Street. The resulting regional growth volumes are shown on Figure 4-1.

PIPELINE TRIPS

Traffic from three (3) pipeline developments were included to obtain the 2021 background traffic forecasts (future traffic forecasts without the development). Each individual pipeline development is located on Figure 4-2 and their individual trip generation is summarized in Table 4-1. The total pipeline trip assignments with all the pipeline developments are shown on Figure 4-3. Each pipeline development is described below:

1) Flagship Carwash [Tax Map 38-3((2))115 and 38-3((2))152A]: The subject site is located on 540 Maple Avenue. On May 9, 2018, the Vienna Town Council unanimously approved Rezoning PF-40-15-PMAC for the subject property. The development will include:

   - Car Wash
   - Fast-food Restaurant with Drive-thru of 5,001 GSF

This site is currently under construction.

2) Vienna Market (Marco Polo Restaurant) [Tax Map 38-4((4))2 & 4 and 38-4((2))15, 16 and 17]: The subject site is located at 245 Maple Avenue and 101, 107, 115 Pleasant Street. The Rezoning (PF-74-15-PMAC) would consolidate a number of uses including some retail and an approximately 22,000 GSF vacant space including the former Marco Polo Restaurant. The new development will include:

- Retail uses of approximately 8,200 GSF
- 44 Townhouse style units

The project was approved by the Town Council on May 7, 2018.

3) 444 Maple Avenue [Tax Map 38-3((2))139, 140 & 141]: The subject site is located at 444 Maple Avenue. The rezoning application proposes to raze a 119 room hotel and 3,500 GSF sit down restaurant and construct a new mixed use building which would consist of:

- 160 Multifamily dwelling units
- 20,000 GSF retail

This site is scheduled to return to the Town Council for a decision on October 29, 2018.

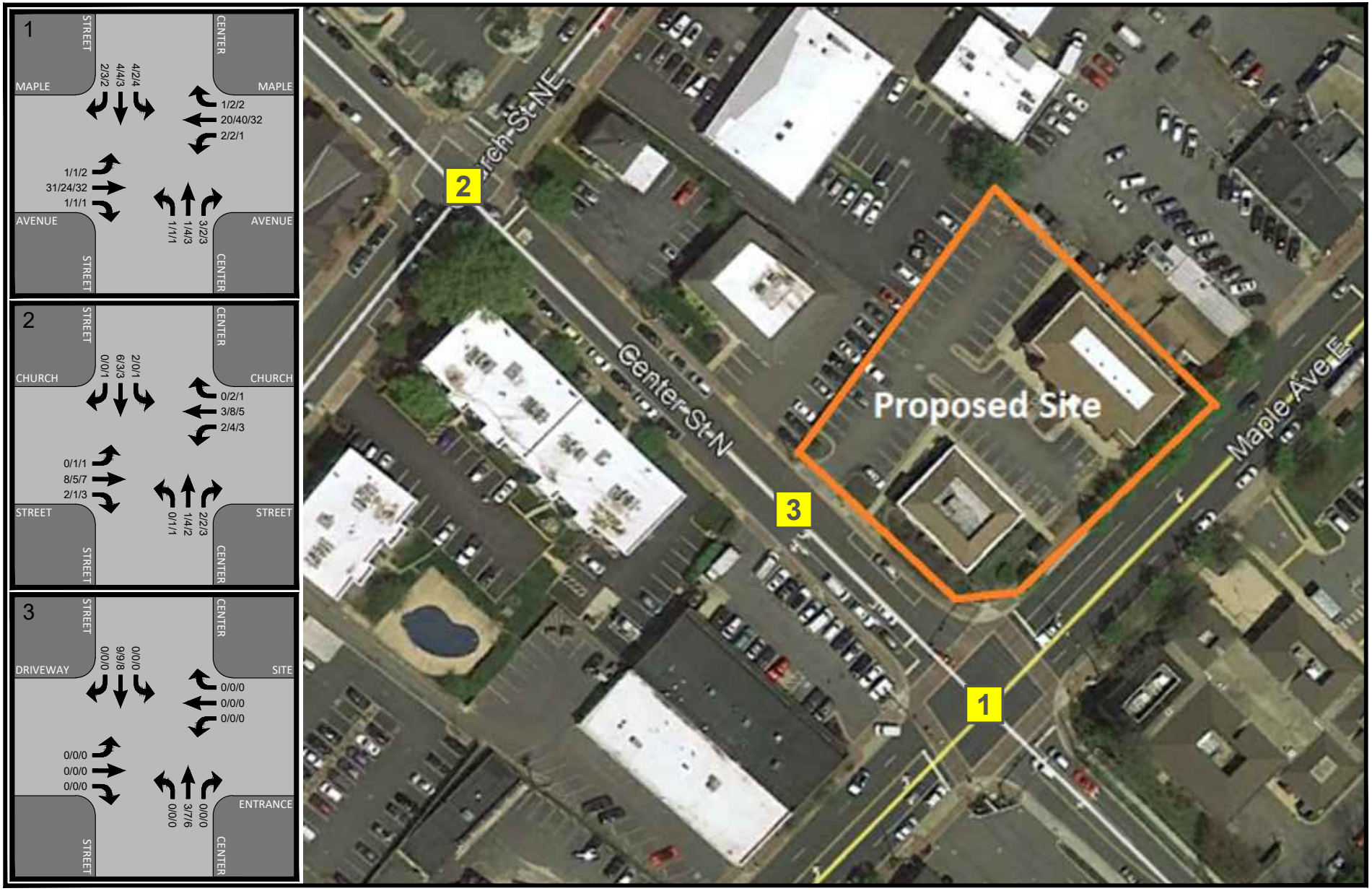


Figure 4-1
2021 Regional Traffic Growth

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

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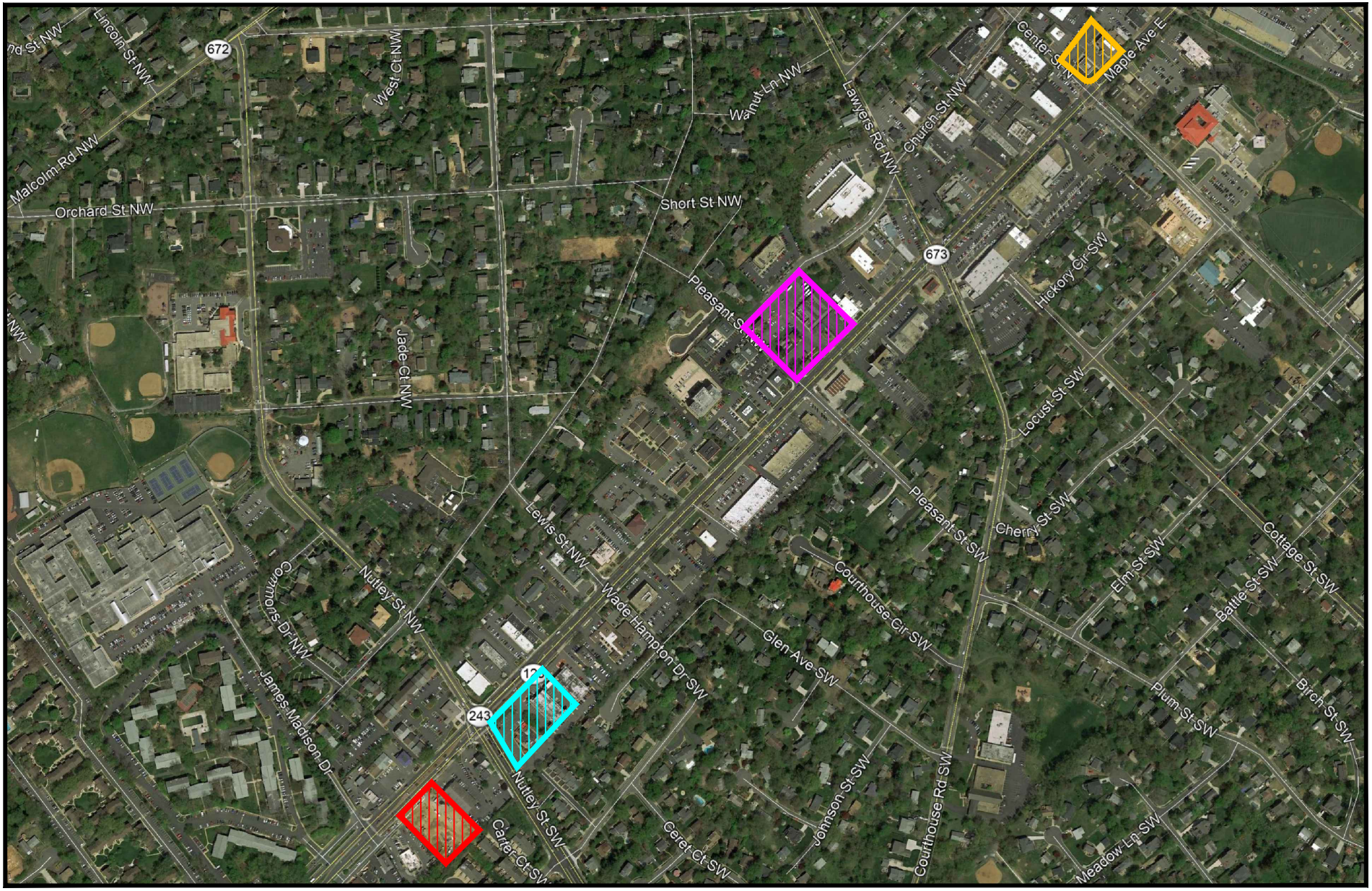


Figure 4-2
Location of Pipeline Developments

Car Wash

444 Maple

Marco Polo

Site Location

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 4-1
100/102/112 Maple Avenue East
Pipeline Trip Generation Analysis [1][2][3]

Land Use	Land Use Code	Size	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Weekday ADT	Saturday Peak Hour In	Saturday Peak Hour Out	Saturday Peak Hour Total
Marco Polo Site													
ITE - Shopping Center	820	8,200	SF	21	13	34	54	58	112	1,336	89	83	172
Internal Capture (5% AM, 10% PM, 15% ADT)				*(1)*	*0*	*(1)*	*(1)*	*(2)*	*(3)*	*(47)*	*(2)*	*(3)*	*(5)*
				20	13	33	53	56	109	1,289	87	80	167
Pass-by Reduction (60%)				*(12)*	*(8)*	*(20)*	*(32)*	*(34)*	*(65)*	*(773)*	*(52)*	*(48)*	*(100)*
Retail Subtotal				8	5	13	21	22	44	516	35	32	67
Townhouses	230	44	DU	5	22	27	21	10	31	315	27	23	50
Internal Capture (5% AM, 10% PM, 15% ADT)				0	(1)	(1)	(2)	(1)	(3)	(47)	(3)	(2)	(5)
Residential Subtotal				5	21	26	19	9	28	268	24	21	45
Total Trips				**13**	**26**	**39**	**40**	**31**	**71**	**784**	**59**	**53**	**112**
Flagship Car Wash & Restaurant													
Car Wash				1	0	1	31	32	63	630	84	90	174
Fast-food Restaurant with Drive-thru	934	5,001	SF	116	112	228	85	79	164	2,482	151	145	296
Pass-By Trip Reduction				*(59)*	*(57)*	*(116)*	*(40)*	*(37)*	*(77)*		*(71)*	*(68)*	*(139)*
Diverted Link Trip Reduction				*(32)*	*(31)*	*(63)*	*(20)*	*(18)*	*(38)*		*(35)*	*(33)*	*(68)*
Restaurant New Primary				24	24	48	26	24	48		45	44	48
Total Trips				**25**	**24**	**49**	**57**	**56**	**111**	**3,112**	**129**	**134**	**263**
444 Maple Avenue													
Apartment	220	160	Rooms	16	66	82	69	37	106	1,093	45	38	83
Internal allowance (5%/10%/15%)				*(1)*	*(2)*	*(3)*	*(3)*	*(2)*	*(5)*	*(133)*	*(7)*	*(6)*	*(13)*
Saturday Off-Peak Reduction (2% In, 0% Out)											*(1)*	*0*	*(1)*
Net External Trips				15	64	79	66	35	101	960	37	32	70
Specialty Retail	826	20,000	SF	*36*	*38*	*74*	*24*	*30*	*54*	*886*	*160*	*147*	*307*
Retail Subtotal				36	38	74	24	30	54	886	160	147	307
Internal allowance (5%/10%/15%)				*(2)*	*(1)*	*(3)*	*(2)*	*(3)*	*(5)*	*(133)*	*(6)*	*(7)*	*(13)*
Saturday Off-Peak Reduction (0% In, 2.2% Out)											*0*	*(3)*	*(3)*
Net External Trips				34	37	71	22	27	49	753	154	137	294
Pass-by Trips (35%)				*(12)*	*(13)*	*(25)*	*(8)*	*(9)*	*(17)*	*(264)*	*(54)*	*(48)*	*(103)*
Net New External Retail Trips				22	24	46	14	18	32	489	100	89	191
Total Trips				**37**	**88**	**125**	**80**	**53**	**133**	**1,449**	**137**	**121**	**261**

Note(s):
1. Trip generation methodology for Marco Polo Site consistent with TIA performed by Wells + Associates and dated December 12, 2017; program reflects that approved by Council.
2. Trip generation for Flagship Car Wash & Restaurant consistent with TIA performed by Wells + Associates and dated April 6, 2016
3. Trip generation for 444 Maple Avenue consistent with TIA performed by Wells + Associates and dated February 16, 2018



Figure 4-3
Total Pipeline Trip Assignments

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

TOTAL BACKGROUND FUTURE TRAFFIC FORECASTS

Background future traffic forecasts (without the proposed development) were developed for the forecast year of 2021. These forecasts were developed by combining the baseline traffic volumes shown on Figure 3-1, regional growth estimates shown on Figure 4-1, and the total pipeline trip assignments shown on Figure 4-3. The resulting background traffic forecasts for year 2021 are provided on Figure 4-4.

TRANSPORTATION IMPROVEMENTS BY OTHERS

No programmed transportation improvements/enhancements (by others) were identified for roadways within the immediate study area. The background future lane use and traffic controls assumed under background conditions are consistent with existing conditions as shown on Figure 2-3.



Figure 4-4
2021 Background Future Traffic Forecasts

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

OPERATIONAL ANALYSIS

The total background future (without proposed development) capacity analysis for year 2021 were performed at the study intersections based on the background future traffic forecasts shown on Figure 4-4 and the existing lane use and traffic controls shown on Figure 2-3. The results of the background future conditions analysis are presented in Appendix G and summarized in Table 4-2. The results are also summarized graphically on Figure 4-5.

Results. The results of the background future (without the proposed development) intersection capacity analysis indicate the signalized Maple Avenue/Center Street intersection continues to operate at an overall level of service (LOS "C" or better) during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections have traffic movements that operate at LOS "D" or better in the AM, PM and Saturday peak hours. The driveway that serves the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours.

QUEUING ANALYSIS

A queuing analysis was conducted for 2021 background conditions at the study intersections and compared to the queuing analysis completed for existing conditions. The results are summarized in Table 4-3. Queue reports are also provided in Appendix G. As shown on Table 4-3, all 95th percentile queues continue to be contained within the available effective storage in the background total future (without the proposed) condition consistent with existing conditions.

Table 4-2
100/102/112 Maple Avenue East
Background Future Intersection Levels of Service Summary (1) (2) (3)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2018 AM	Existing 2018 PM	Existing 2018 SAT	Background 2021 AM	Background 2021 PM	Background 2021 SAT
1 **Center Street**/Maple Avenue	Signal		EBL	B (13.7)	B (17.1)	C (20.4)	B (13.5)	B (18.0)	B (19.9)
		Maple Avenue	EBT	C (22.5)	B (17.3)	C (26.8)	C (22.9)	B (17.2)	C (26.1)
			EBTR	C (22.4)	B (17.3)	C (26.7)	C (22.8)	B (17.2)	C (26.0)
			WBL	B (16.0)	B (12.4)	B (19.2)	B (16.3)	B (12.3)	B (18.6)
		Maple Avenue	WBT	B (18.1)	C (22.7)	C (27.5)	B (17.9)	C (23.4)	C (26.9)
			WBTR	B (18.0)	C (22.7)	C (27.5)	B (17.9)	C (23.4)	C (26.9)
		Center Street	NBL	D (49.3)	E (58.2)	D (45.7)	D (49.2)	E (58.0)	D (46.0)
			NBTR	E (64.5)	F (93.6)	E (62.0)	E (64.5)	F (93.6)	E (60.8)
		Center Street	SBL	D (46.8)	E (57.2)	D (44.3)	D (46.6)	E (57.4)	D (44.1)
			SBTR	D (54.8)	F (101.2)	D (50.9)	D (54.7)	F (95.2)	D (50.8)
			Overall	**C (28.4)**	**C (34.8)**	**C (31.5)**	**C (28.2)**	**C (33.8)**	**C (30.8)**
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	C [16.2]	B [14.6]	C [17.2]	B [15.0]	B [14.7]	C [17.8]
		Church Street	WBLTR	B [12.3]	D [31.7]	C [15.3]	B [12.0]	D [34.1]	C [15.6]
		Center Street	NBLTR	B [10.7]	C [15.9]	B [13.9]	B [10.4]	C [16.3]	B [13.7]
		Center Street	SBLTR	B [14.1]	B [12.9]	B [11.8]	B [13.5]	B [13.0]	B [12.0]
3 **Center Street**/Site Driveway	STOP	Driveway	EBLTR	B [11.8]	B [12.4]	B [12.9]	B [11.5]	B [12.2]	B [12.8]
		Site Entrance	WBLTR	A [0.0]	B [14.6]	B [11.7]	A [0.0]	B [14.2]	B [11.6]
		Center Street	NBLTR	A [8.1]	A [8.0]	A [8.1]	A [8.1]	A [8.0]	A [8.0]
		Center Street	SBLTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]

Notes (1) Numbers in parentheses ( ) represent delay at signalized intersections in seconds per vehicle.
(2) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
(3) Roadway names in bold are considered north/south for purposes of this analysis

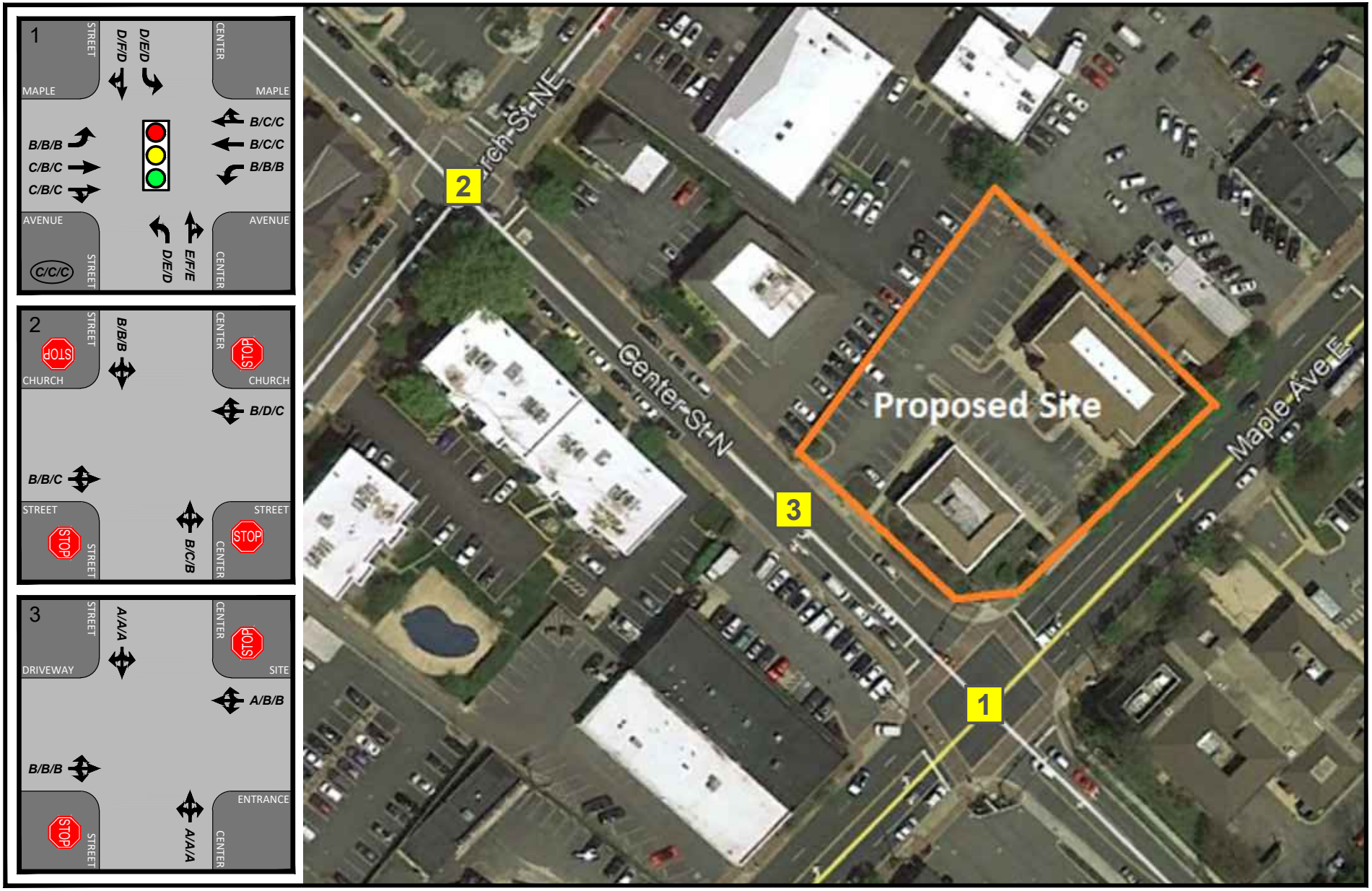


Figure 4-5
2021 Background Future Levels of Service Results

Represents One Travel Lane
Signalized Intersection
Stop Sign

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 4-3
100/102/112 Maple Avenue East
Background Future Intersection Queuing Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage (ft)	Existing 2018 AM	Existing 2018 PM	Existing 2018 SAT	Background 2021 AM	Background 2021 PM	Background 2021 SAT
1 **Center Street**/Maple Avenue	Signal	Maple Avenue	EBL	140	22	33	53	23	33	53
			EBTR	-	476	331	547	510	342	589
		Maple Avenue	WBL	200	43	37	40	44	38	40
			WBTR	-	282	597	562	291	647	610
		Center Street	NBL	100	67	73	62	67	74	64
			NBTR	-	160	361	217	159	368	224
		Center Street	SBL	-	160	99	138	163	101	144
			SBTR	-	232	378	191	238	392	197
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	-	98	60	103	85	60	110
		Church Street	WBLTR	-	40	220	75	40	235	80
		Center Street	NBLTR	-	20	68	58	18	73	53
		Center Street	SBLTR	-	63	30	25	58	30	25
3 **Westbranch Drive**/Jones Branch Drive	STOP	Driveway	EBLTR	-	5	3	5	5	3	5
		Site Entrance	WBLTR	-	0	0	0	0	0	0
		Center Street	NBLTR	-	0	0	0	0	0	0
		Center Street	SBLTR	-	0	0	0	0	0	0

Notes (1) Turning movement queue length is based on the 95th percentile queue as reported by Synchro, Version 10.

(2) Roadway names in bold are considered north/south for purposes of this analysis

SECTION 5

SITE ANALYSIS

OVERVIEW

The Applicant has filed a rezoning application to permit the development of approximately 85 assisted living units (105 beds) and 8,400 GSF additional retails uses. As scoped with Town staff, this TIA provides an analysis of 2021 build-out conditions. The trip generation and distribution analyses were conducted in accordance with the established study scope provided in Appendix A.

EXISTING SITE DRIVEWAY TRAFFIC REMOVED

The existing peak hour driveway trips associated with the subject property as counted by W+A were removed from the road network as shown on Figure 5-1.

SITE TRIP GENERATION ANALYSIS

The number of trips that would be generated by the proposed development were estimated based on the ITE 10th Edition, Trip Generation Manual using the peak hour of the adjacent street rates/equations, where applicable. The trip generation for the proposed mixed-use development is summarized on Table 5-1 and described below.

- 25 weekday AM peak hour trips
- 37 weekday PM peak hour trips
- 36 Saturday peak hour trips
- 379 average weekday daily trips

The net new external vehicle trips detailed above include an internal allowance reduction of 5%, 10%, and 15% in the AM, PM, and Saturday peak hours respectively. This reduction, consistent with the agreed upon scope provided in Appendix A, accounts for trips going to/from the assisted living/retail components that are contained to the site. Additionally, a 35% pass-by reduction for the retail component only was taken to account for existing trips that are currently on the existing network that would be pulled from the network to utilize the retail portion of the site.

Table 5-1 also provides a trip generation analysis assuming the subject site operated with the existing medical office buildings fully occupied. As shown in Table 5-1, the proposed redevelopment would generate a number of trips generally consistent with the trip generation potential of the existing developed uses.

PROPOSED SITE ACCESS

Vehicular access to the subject property is proposed to be provided by a full-movement driveway as it currently exists on Center Street. A reduction of the proposed layout is provided on Figure 2-1 and a full-size copy of the Rezoning Plan layout is included as Appendix B. The total future lane use and traffic controls assumed under total future conditions is shown on Figure 5-2.

SITE TRIP DISTRIBUTION

The distribution of the new vehicle peak hour trips generated by the proposed mixed-use development were based on a review by Town staff, a review of existing traffic patterns in the study area, future development patterns, local knowledge, and engineering judgment. As scoped and agreed to with Town staff (see Appendix A), the trip distributions assumed for the proposed development are depicted on Figure 5-3.

SITE TRIP ASSIGNMENTS

The new vehicle peak hour trips summarized in Table 5-1 were assigned to the public roadway network according to the directional distributions depicted on Figure 5-3. The resulting trip assignments are also provided on Figure 5-3. The pass-by trip assignments were based on prevailing traffic volumes along Maple Avenue and are shown on Figure 5-4.



Figure 5-1
Removed Existing Site Trips

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 5-1
100/102/112 Maple Avenue East
Site Trip Generation [1]

Scenario	Land Use Code	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips	Saturday Peak Hour In	Saturday Peak Hour Out	Saturday Peak Hour Total
Existing Uses													
Medical Office	720	10,980	SF	24	7	31	11	28	39	334	19	15	34
Proposed Program													
Assisted Living	254	105	Beds	13	7	20	11	18	29	273	13	15	28
Internal allowance (5%/10%/15%)				*0*	*0*	*0*	*(1)*	*(1)*	*(2)*	*(40)*	*(1)*	*(1)*	*(2)*
Net External Trips				13	7	20	10	17	27	233	12	14	26
Shopping Center	820	8,400	SF	5	3	8	9	9	18	264	8	8	16
Internal allowance (5%/10%/15%)				*0*	*0*	*0*	*(1)*	*(1)*	*(2)*	*(40)*	*(1)*	*(1)*	*(2)*
Net External Trips				5	3	8	8	8	16	224	7	7	14
Pass-by Trips (35%)				(2)	(1)	(3)	(3)	(3)	(6)	(78)	(2)	(2)	(4)
Net New External Retail Trips				3	2	5	5	5	10	146	5	5	10
Net New Trips				16	9	25	15	22	37	379	17	19	36
Difference (Proposed minus Existing)				(8)	2	(6)	4	(6)	(2)	45	(2)	4	2

Note(s):
(1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 10th Edition.

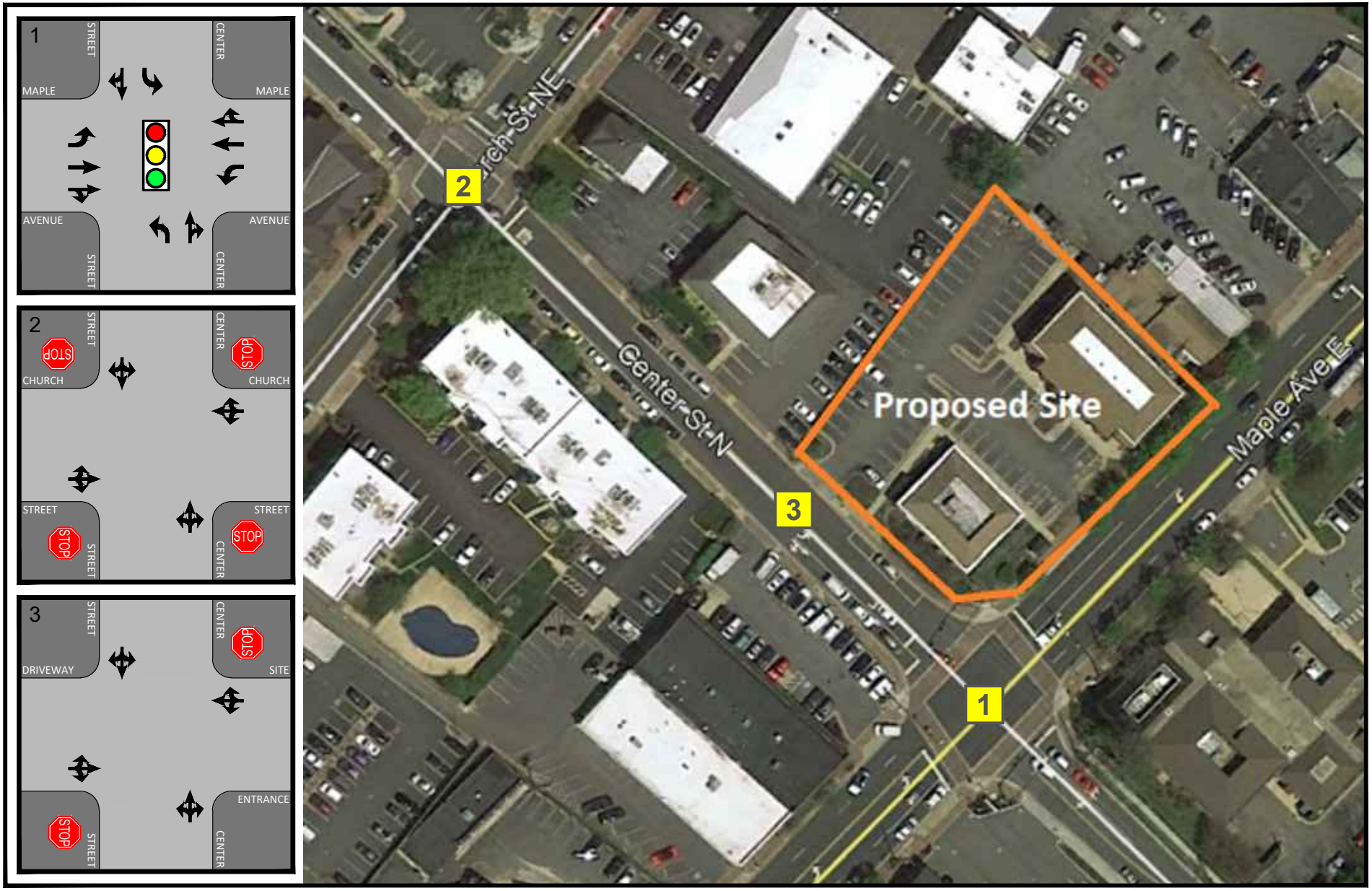


Figure 5-2
Future Lane Use and Traffic Controls

Represents One Travel Lane
Signalized Intersection
Stop Sign

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

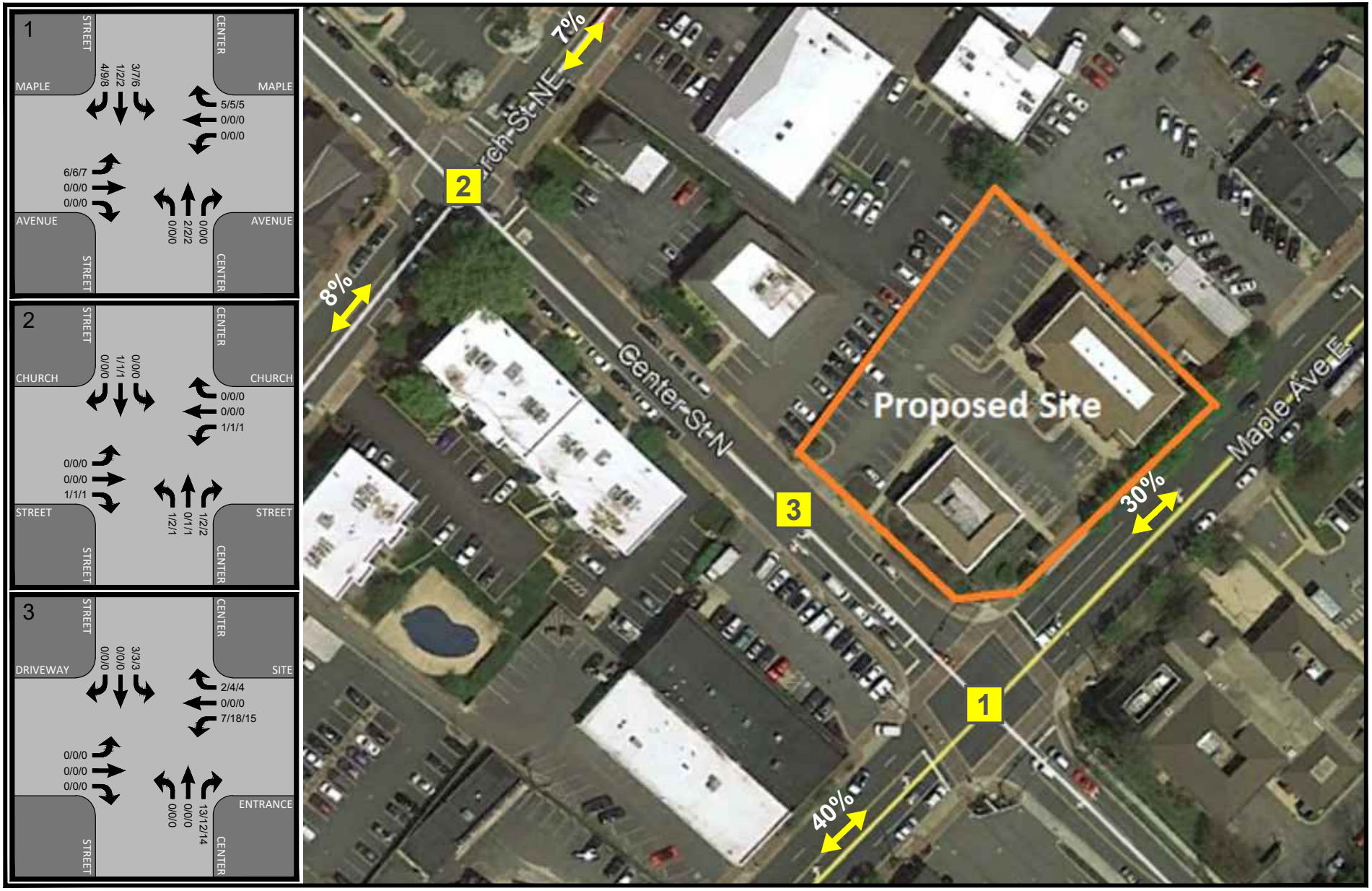


Figure 5-3
Site Trip Assignments and Percent Distribution

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

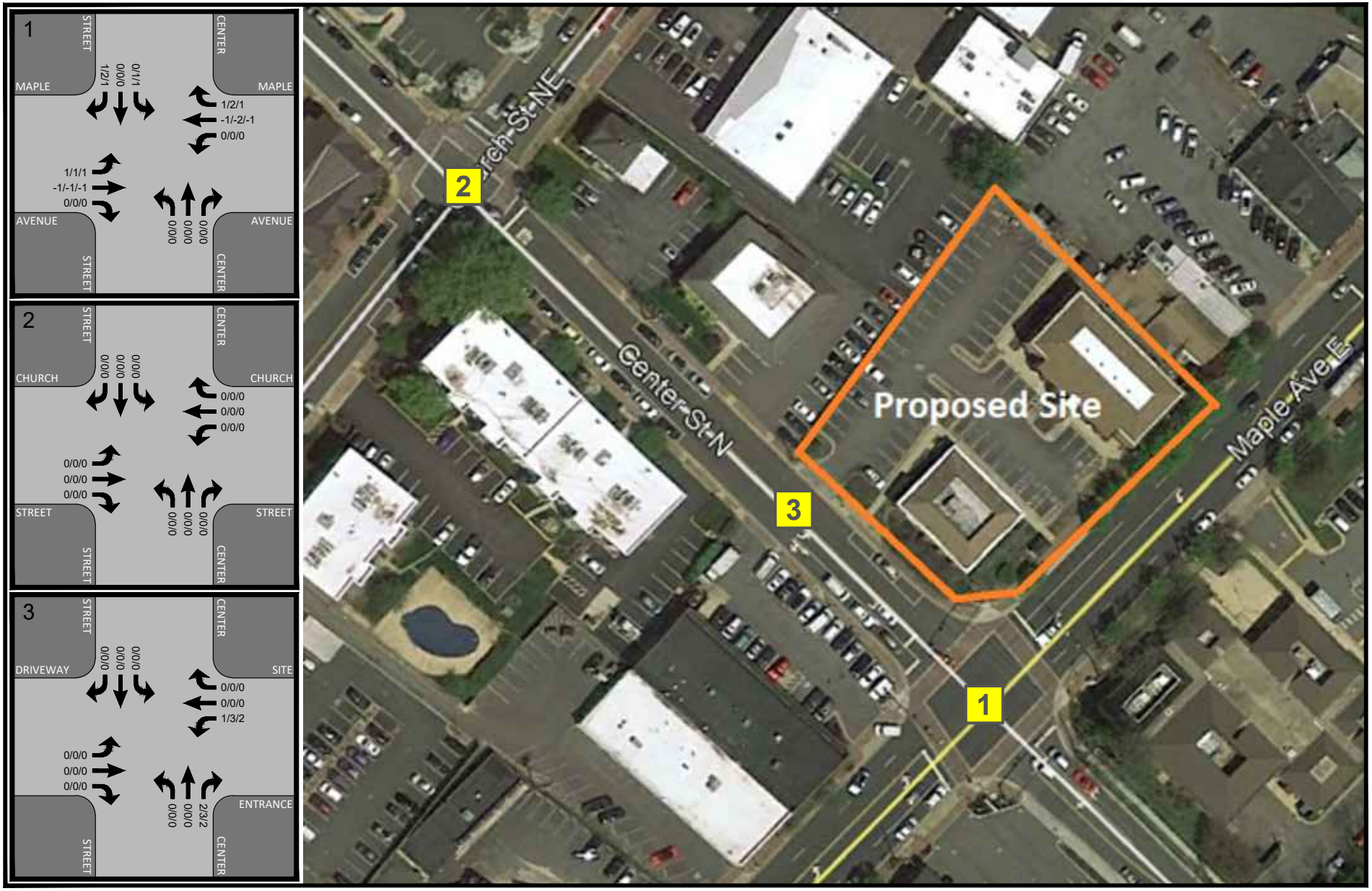


Figure 5-4
Pass-by Trip Assignments

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

SECTION 6

2021 BUILD OUT ANALYSIS OF TOTAL FUTURE CONDITIONS WITH PROPOSED DEVELOPMENT

TOTAL FUTURE TRAFFIC FORECASTS

The 2021 total future traffic forecasts associated with the proposed mixed-use development were developed by combining the baseline traffic volumes shown on Figure 3-1, regional growth estimates shown on Figure 4-1, the total pipeline trip assignments shown on Figure 4-3, the removal of existing site trips as shown on Figure 5-1, the total site trip assignments shown on Figure 5-3, and the pass-by trip assignments shown on Figure 5-4. The resulting total future traffic forecasts for year 2021 are provided on Figure 6-1.

OPERATIONAL ANALYSIS

The total future (with proposed development) capacity analysis for year 2021 were performed at the study intersections based on the total future traffic forecasts shown on Figure 6-1 and the future lane use and traffic controls shown on Figure 5-2. The results of the total future conditions analysis are presented in Appendix H and summarized in Table 6-1. The results are also summarized graphically on Figure 6-2.

Results. The results of the total future (with the proposed development) intersection capacity analysis indicate the signalized Maple Avenue/Center Street intersection continues to operate during the weekday AM, PM and Saturday peak hours consistent with background future conditions at overall LOS "C". All the STOP controlled intersections have traffic movements that operate at LOS "D" or better in the AM, PM and Saturday peak hours, with the exception of the westbound left-through-right movement which degrades by one (1) second and performs at LOS "E" in the PM Peak Hour. The driveway that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours consistent with background conditions.

QUEUING ANALYSIS

A queuing analysis was conducted for 2021 total future conditions at the study intersections and compared to the queuing analysis completed for background conditions. The results are summarized in Table 6-2. Queue reports are also provided in Appendix H. As shown on Table 6-2, all of the 95th percentile queues would be contained within the available effective storage consistent with background future conditions.



Figure 6-1
2021 Total Future Traffic Forecasts

AM PEAK HOUR
PM PEAK HOUR
SAT PEAK HOUR
000 / 000 / 000

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 6-1
100/102/112 Maple Avenue East
Total Future Intersection Levels of Service Summary (1) (2) (3)

Intersection	Operating Condition	Street Name	Approach/ Movement	Existing 2018 AM	Existing 2018 PM	Existing 2018 SAT	Background 2021 AM	Background 2021 PM	Background 2021 SAT	Total Future 2021 AM	Total Future 2021 PM	Total Future 2021 SAT
1 **Center Street**/Maple Avenue	Signal		EBL	B (13.7)	B (17.1)	C (20.4)	B (13.5)	B (18.0)	B (19.9)	B (13.6)	B (18.8)	C (20.6)
		Maple Avenue	EBT	C (22.5)	B (17.3)	C (26.8)	C (22.9)	B (17.2)	C (26.1)	C (23.0)	B (17.5)	C (26.4)
			EBTR	C (22.4)	B (17.3)	C (26.7)	C (22.8)	B (17.2)	C (26.0)	C (22.9)	B (17.4)	C (26.4)
			WBL	B (16.0)	B (12.4)	B (19.2)	B (16.3)	B (12.3)	B (18.6)	B (16.4)	B (12.5)	B (18.9)
		Maple Avenue	WBT	B (18.1)	C (22.7)	C (27.5)	B (17.9)	C (23.4)	C (26.9)	B (18.4)	C (23.9)	C (27.5)
			WBTR	B (18.0)	C (22.7)	C (27.5)	B (17.9)	C (23.4)	C (26.9)	B (18.4)	C (24.0)	C (27.5)
		Center Street	NBL	D (49.3)	E (58.2)	D (45.7)	D (49.2)	E (58.0)	D (46.0)	D (49.2)	E (58.3)	D (46.0)
			NBTR	E (64.5)	F (93.6)	E (62.0)	E (64.5)	F (93.6)	E (60.8)	E (64.5)	F (92.9)	E (61.0)
		Center Street	SBL	D (46.8)	E (57.2)	D (44.3)	D (46.6)	E (57.4)	D (44.1)	D (46.6)	E (58.3)	D (44.2)
			SBTR	D (54.8)	F (101.2)	D (50.9)	D (54.7)	F (95.2)	D (50.8)	D (54.9)	F (101.3)	D (51.0)
			Overall	**C (28.4)**	**C (34.8)**	**C (31.5)**	**C (28.2)**	**C (33.8)**	**C (30.8)**	**C (28.5)**	**C (34.9)**	**C (31.3)**
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	C [16.2]	B [14.6]	C [17.2]	B [15.0]	B [14.7]	C [17.8]	C [15.2]	B [14.9]	C [18.0]
		Church Street	WBLTR	B [12.3]	D [31.7]	C [15.3]	B [12.0]	D [34.1]	C [15.6]	B [12.1]	E [35.1]	C [15.7]
		Center Street	NBLTR	B [10.7]	C [15.9]	B [13.9]	B [10.4]	C [16.3]	B [13.7]	B [10.5]	C [16.6]	B [13.7]
		Center Street	SBLTR	B [14.1]	B [12.9]	B [11.8]	B [13.5]	B [13.0]	B [12.0]	B [13.6]	B [13.2]	B [12.0]
3 **Center Street**/Site Driveway	STOP	Driveway	EBLTR	B [11.8]	B [12.4]	B [12.9]	B [11.5]	B [12.2]	B [12.8]	B [11.6]	B [12.4]	B [12.9]
		Site Entrance	WBLTR	A [0.0]	B [14.6]	B [11.7]	A [0.0]	B [14.2]	B [11.6]	B [12.2]	B [14.3]	B [14.1]
		Center Street	NBLTR	A [8.1]	A [8.0]	A [8.1]	A [8.1]	A [8.0]	A [8.0]	A [8.1]	A [8.0]	A [8.0]
		Center Street	SBLTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [7.5]	A [7.9]	A [7.8]

Notes (1) Numbers in parentheses ( ) represent delay at signalized intersections in seconds per vehicle.
(2) Numbers in brackets [] represent delay at unsignalized intersections in seconds per vehicle.
(3) Roadway names in bold are considered north/south for purposes of this analysis

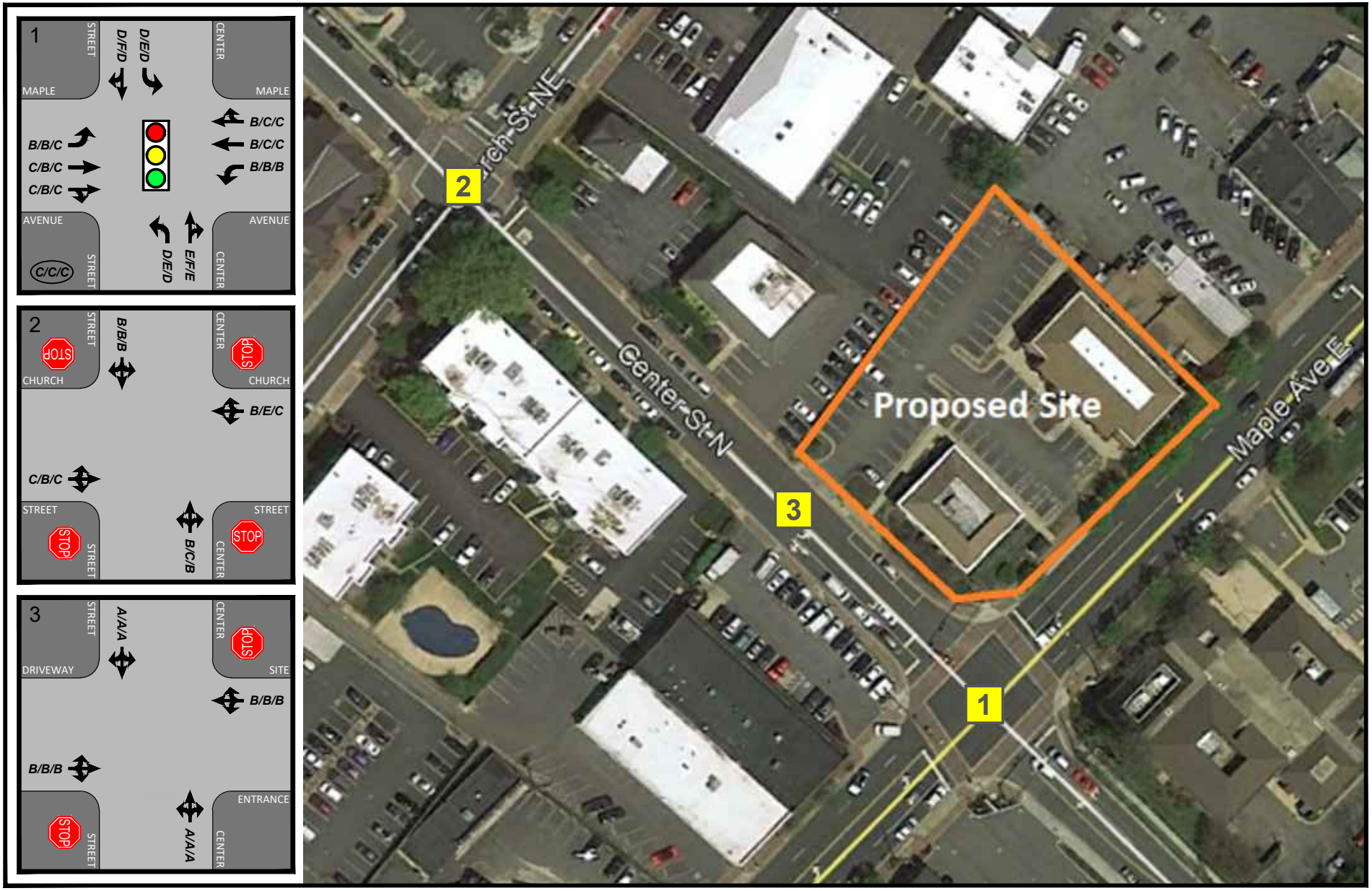


Figure 6-2
2021 Total Future Levels of Service Results

Represents One Travel Lane
Signalized Intersection
Stop Sign

NORTH

100/102/112 Maple Avenue East
Town of Vienna, Virginia

Table 6-2
100/102/112 Maple Avenue East
Total Future Intersection Queuing Summary (1) (2)

Intersection	Operating Condition	Street Name	Approach/ Movement	Available Storage (ft)	Existing 2018 AM	Existing 2018 PM	Existing 2018 SAT	Background 2021 AM	Background 2021 PM	Background 2021 SAT	Total Future 2021 AM	Total Future 2021 PM	Total Future 2021 SAT
1 **Center Street**/Maple Avenue	Signal	Maple Avenue	EBL	140	22	33	53	23	33	53	28	37	58
			EBTR	-	476	331	547	510	342	589	511	342	590
		Maple Avenue	WBL	200	43	37	40	44	38	40	44	38	40
			WBTR	-	282	597	562	291	647	610	297	652	614
		Center Street	NBL	100	67	73	62	67	74	64	67	74	64
			NBTR	-	160	361	217	159	368	224	162	370	227
		Center Street	SBL	-	160	99	138	163	101	144	166	112	149
			SBTR	-	232	378	191	238	392	197	244	420	206
2 **Center Street**/Church Street	STOP	Church Street	EBLTR	-	98	60	103	85	60	110	88	60	110
		Church Street	WBLTR	-	40	220	75	40	235	80	40	240	80
		Center Street	NBLTR	-	20	68	58	18	73	53	20	75	53
		Center Street	SBLTR	-	63	30	25	58	30	25	58	30	28
3 **Westbranch Drive**/Jones Branch Drive	STOP	Driveway	EBLTR	-	5	3	5	5	3	5	5	3	5
		Site Entrance	WBLTR	-	0	0	0	0	0	0	3	5	5
		Center Street	NBLTR	-	0	0	0	0	0	0	0	0	0
		Center Street	SBLTR	-	0	0	0	0	0	0	0	0	0

Notes (1) Turning movement queue length is based on the 95th percentile queue as reported by Synchro, Version 10.
(2) Roadway names in bold are considered north/south for purposes of this analysis

SECTION 7

TRANSPORTATION DEMAND MANAGEMENT

In an effort to decrease reliance on the personal automobile and encourage the use of transit, ridesharing, bicycling, and walking, the Applicant should implement a TDM Program. "TDM is a general term for strategies that result in more efficient use of transportation resources. There are many different TDM strategies with a variety of impacts. Some improve the transportation options available to consumers, while others provide an incentive to choose more efficient travel patterns. Some reduce the need for physical travel through mobility substitutes or more efficient land use. TDM strategies can change travel timing, route, destination, or mode."

The following strategies should be considered:

A. Designate a Transportation Management Coordinator (TMC) to implement the TDM program and advise employees of the assisted living use of the availability and location of the TDM coordinator and program at least once a year. The position may be part of other duties assigned to the individual. Duties of the TMC would include the following:

    1. Assist employees in making effective and efficient commuting choices.
    2. Disseminate Metrorail, Fairfax Connector, ridesharing, and other relevant transit options to new residents, tenants and employees.
    3. Solicit support from the Metropolitan Washington Council of Governments (MWCOG) Commuter Connections program, the Washington Metropolitan Area Transit Authority (WMATA), the Fairfax County government, and others.
    4. Provide on-site assistance to employees in forming and maintaining carpools and vanpools.
    5. Disseminate park-and-ride lot information to prospective carpoolers and vanpoolers.
    6. Encourage residents and employees to ride bikes or walk to work.
    7. Market and promote the TDM Program among residents and employees through printed materials and web sites (if available).

B. Incentives to use transit, including:

    1. Provide information on Metrorail, Fairfax Connector, and other public transportation facilities, services, routes, schedules, and fares.
    2. At the time of initial employment, provide SmarTrip cards to employees.
    3. Provide safe, convenient, and attractive pedestrian connections on and off-site.
    4. Provide safe, secure bicycle parking for both employees and residents.

C. Parking management, including:

    1. Provide a parking space on site for a car sharing service (i.e., Zip or Flex Car).
    2. Institute parking management strategies for the use of the tandem spaces provided in the garage.

SECTION 8

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on this assessment, the traffic generated by the proposed mixed-use development will not adversely impact nearby intersections based on the following:

1. The proposed application seeks to rezone and redevelop approximately 0.74 acres with a mixed-use building comprising of approximately 85 assisted living units (105 beds) and 8,400 GSF of ground floor retail uses.

2. Under existing 2018 conditions, the signalized Maple Avenue/Center Street intersection currently operates at an overall level of service (LOS) "C" or better during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections have traffic movements that are LOS "D" or better and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours.

3. Roadway intersections within the study area would experience increases in traffic as a result of background regional growth and future pipeline developments (including the potential development of the Flagship Carwash, Marco Polo Restaurant (Vienna Market), and 444 Maple Avenue sites).

4. Under 2021 background conditions (build out of the future conditions without the proposed mixed-use development), the signalized Maple Avenue/Center Street study intersection would continue to operate at overall LOS "C" or better during the weekday AM and PM and Saturday peak hours consistent with existing conditions All the STOP controlled intersections have traffic movements that are LOS "D" or better and driveways that serve the site have traffic movements that operate at LOS "B" or better in the AM, PM and Saturday peak hours consistent with existing conditions.

5. According to the Institute of Transportation Engineers (ITE) 10th Edition *Trip Generation Manual*, the proposed mixed-use development is anticipated to generate approximately 25 weekday AM peak hour net new external trips, 37 weekday PM peak hour net new external trips, 36 Saturday peak hour net new external trips, and 379 daily (24-hour) net new external trips. These site trips include an internal allowance reduction between the assisted living and retail components, as well as a pass-by reduction for the retail component.

6. Under 2021 total future conditions (build out of the future conditions with the proposed mixed-use development), the signalized Maple Avenue/Center Street study intersection would continue to operate at overall LOS "C" during the weekday AM, weekday PM, and Saturday peak hours consistent with background future levels of service. All the STOP controlled intersections have traffic movements that are LOS "D" or better with the exception of the Westbound approach which degrades by one (1) second to LOS "E" and driveways that serve the site have traffic movements that operate at LOS "B" or better in the

AM, PM and Saturday peak hours consistent with background conditions.

7. The existing, background and future analysis scenarios indicate that the weekday AM, PM and Saturday peak hour vehicle queues would be accommodated within existing turn lane bays.

RECOMMENDATIONS

The results of the analysis summarized above indicate negligible impacts to intersection operations within the study area. However, in order to address the minimal net trips generated by the proposed mixed-use development, the following are recommended:

1. The Applicant should promote the pedestrian oriented and mixed-use characteristics of the development by establishing a quality streetscape with pedestrian amenities. Guidance will be provided by the approved pedestrian master plan and Maple Avenue Corridor (MAC) Zone guidelines. These include; wide sidewalks meeting the MAC's recommended width, improved bus stops located along the frontage, and enhancing the walking experience through design elements (e.g. landscaping, street furniture, public art and/or wayfinding).

2. The Applicant should implement certain elements of a Transportation Demand Management (TDM) program in order to further reduce the forecasted peak hour trips for this project, encourage transit related, non-auto modes of travel, and take advantage of the site's proximity to transit service.

3. The Town of Vienna promotes and encourages bicycling as an environmentally and healthy way to get around town and was designated as a Bicycle Friendly Community by the League of American Bicyclists. The Applicant should evaluate incorporating short term bike parking into the site design as appropriate and feasible.