

**444 MAPLE
MULTI-MODAL TRANSPORTATION
IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA**

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TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	i
Purpose of Report & Study Objectives	i
Site Location and Study Area	i
Description of Proposed Development	i
Conclusions.....	ii
Recommendations	iii
 Section 1	
INTRODUCTION	1
Purpose	1
Study Objectives	1
Study Methodology.....	3
Study Area.....	3
 Section 2	
BACKGROUND INFORMATION	6
Site Location/Description	6
Comprehensive Plan	6
Roadway Network.....	9
Transit Facilities	9
Pedestrian/Bicycle Facilities	10
 Section 3	
ANALYSIS OF EXISTING CONDITIONS	15
Traffic Volumes	15
Operational Analysis.....	15
Queuing Analysis.....	16
 Section 4	
2022 ANALYSIS OF FUTURE (BACKGROUND) CONDITIONS WITHOUT PROPOSED DEVELOPMENT	22
Methodology	22
Regional Growth.....	22
Pipeline Trips.....	22
Total Background Future Traffic Forecasts	27
Transportation Improvements by Others.....	27
Operational Analysis.....	30
Queuing Analysis.....	30

**444 MAPLE
MULTI-MODAL TRAFFIC IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA**

TABLE OF CONTENTS CONTINUED

	<u>Page</u>
Section 5	
SITE ANALYSIS	34
Overview	34
Existing Site Driveway Traffic to be Removed	34
Site Trip Generation Analysis	34
Proposed Site Access	35
Site Trip Distribution.....	35
Site Trip Assignments	35
Parking Supply	35
Section 6	
2022 BUILD OUT ANALYSIS OF TOTAL FUTURE CONDITIONS	
PROPOSED DEVELOPMENT	42
Total Future Traffic Forecasts	42
Operational Analysis.....	42
Queuing Analysis.....	42
Section 7	
TRANSPORTATION DEMAND MANAGEMENT	49
Section 8	
CONCLUSIONS AND RECOMMENDATIONS	50
Conclusions.....	50
Recommendations.....	51

**444 MAPLE
MULTI-MODAL TRAFFIC IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA**

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1-1	Site Area/Site Location Map	4
1-2	Study Intersections	5
2-1	CDP Layout	7
2-2	Existing Zoning Map.....	8
2-3	Existing Lane Use and Traffic Control	11
2-4	Existing Bus Stops/Shelters.....	12
2-5	Existing Pedestrian Facilities	13
2-6	Existing Bicycle Facilities.....	14
3-1	Existing Peak Hour Traffic Volumes.....	17
3-2	Existing Peak Hour Pedestrian Volumes	18
3-3	Existing Levels of Service Results	20
4-1	2022 Regional Traffic Growth.....	23
4-2	Location of Pipeline Developments	24
4-3	Total Pipeline Trip Assignments.....	26
4-4	2022 Background Future Traffic Forecasts	28
4-5	2022 Background Future Lane Use and Traffic Controls	29
4-6	2022 Background Future Levels of Service Results	32
5-1	Removed Existing Site Trips	38
5-2	Future Lane Use and Traffic Controls.....	39
5-3	Site Trip Assignments and Percent Distribution.....	40
5-4	Parking Supply	41
6-1	2022/2028 Total Future Traffic Forecasts.....	43
6-2	2022/2028 Total Future Levels of Service.....	46

**444 MAPLE
MULTI-MODAL TRAFFIC IMPACT ANALYSIS
TOWN OF VIENNA, VIRGINIA**

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
3-1	Existing Level of Service Summary.....	19
3-2	Intersection Queuing Summary.	21
4-1	Pipeline Trip Generation Summary.....	25
4-2	Background Future Level of Service Summary.....	31
4-3	Background Future Queuing Summary.	33
5-1	Site Trip Generation Analysis	37
6-1	Total Future Level of Service Summary.....	45
6-2	Total Future Queuing Summary.....	48

APPENDICES

Appendix Title

A	Scope of Work Meeting Form
B	Full-size CDP Layout
C	Level of Service Descriptions
D	Bus Schedule Information
E	2016 Existing Traffic Counts
F	2016 Existing Levels of Service & Queue (Synchro Worksheets)
G	2022 Background Levels of Service & Queue (Synchro Worksheets)
H	Diurnal Rate Sources
I	2022/2028 Total Future Levels of Service & Queue (Synchro Worksheets)

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 would redevelop the subject site with a mixed-use building comprising of approximately 160 multifamily dwelling units and 20,000 GSF of 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 off-set any possible impacts.

The application was originally proposed as a mixed used development of 152 multi-family units, 51,190 GSF of grocery use and 5,482 GSF of retail uses. This development program was used to scope the TIA with the Town. 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). In consultation with the Town it was determined that the proposed redevelopment would generate slightly fewer than 5,000 vpd. It was determined that although the application did not technically meet the Chapter 870 trip threshold the trips were substantial enough to include VDOT in the scoping of the TIA.

With the original development program the subject application does not require a VDOT Chapter 870 TIA to be submitted, the TIA presented herein was commissioned by the Applicant to address any traffic related questions which may arise from Town staff, VDOT, and /or the neighboring community during the course of normal review of the rezoning application. Since that time the development program has been reduced but the original scope of work agreed upon was used to prepare the TIA.

SITE LOCATION AND STUDY AREA

The approximate 2.76-acre site is located in the southeast quadrant of the Nutley Street (Route 243) and Maple Avenue (Route 123) intersection in the Town of Vienna, Virginia. The application area is further identified as Fairfax County 2016 Tax Map 38-3 ((2)) 139, 140 & 141. 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/VDOT staff at a scoping meeting held at VDOT on April 19, 2016. The study area is generally bounded by Windover Avenue to the north, Roland Street to the south, James Madison Drive to the west, and Courthouse Road (Route 6648)/Lawyers Road (Route 6648) to the east. Per the approved scoping form, the study area includes eight (8) existing study intersections/driveways. Of the eight (8) existing study intersections, one (1) is an existing site driveway that will be removed as a result of this application. The scoping agreement, as signed by the Town/VDOT, is included herein as Appendix A.

DESCRIPTION OF PROPOSED DEVELOPMENT

The site is currently developed with a 119-room hotel and a 3,500 gross square foot (GSF) sit down

restaurant. Vienna Development Associates LLC (the “Applicant”) proposes to rezone the site from C-1 (Local Commercial) to the Maple Avenue Commercial (“MAC”) district and redevelop with a mixed-use building comprised of up to 160 multifamily dwelling units and 20,000 GSF of additional retail uses.

Access to the site is currently provided via a right-in/right-out on Nutley Street, a right-in/right-out on Maple Avenue and a full-movement driveway at an existing, unsignalized median break on Maple Avenue. The right-in/right-out along Maple Avenue would be removed 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 2.76 acres with approximately 160 multifamily dwelling units and 20,000 GSF of additional retail uses.
2. Under existing 2016 conditions, the signalized Nutley Street/Maple Avenue intersection currently operates at an overall level of service (LOS) “E” or better during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections and driveways that serve the site have traffic movements that operate at LOS “C” 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 redevelopment of the Marco Polo site).
4. Under 2022 background conditions (build out of the future conditions without the proposed mixed-use development), the signalized Nutley Street/Maple Avenue study intersection would show delays at overall LOS “E” or better during the weekday AM and PM peak hours. LOS would degrade to “F” in the Saturday peak hour. All the STOP controlled intersections and driveways that serve the site have traffic movements that continue to operate at LOS “C” or better in the AM, PM and Saturday peak hours consistent with existing conditions.
5. According to ITE, the proposed mixed-use development is anticipated to generate approximately 125 weekday AM peak hour net new external trips, 133 weekday PM peak hour net new external trips, 261 Saturday peak hour net new external trips, and 1,449 daily (24-hour) net new external trips. These site trips include an internal allowance reduction between the residential and retail components, a minor reduction to account for the commercial and residential uses peaking at different times on Saturday, as well as a pass-by reduction for the retail portion.
6. Under 2022 total future conditions (build out of the future conditions with the proposed mixed-use development), the signalized Nutley Street/Maple Avenue study intersection would show levels of service at overall LOS during the weekday AM, weekday PM, and Saturday peak hours consistent with background future levels of service. All the STOP controlled intersections and driveways that serve the site have traffic movements that continue to operate at LOS “E” or better in the AM, PM and Saturday peak hours generally consistent with background conditions with the exception of the northbound left exit

movement out of the site on to Maple Avenue.

7. Under 2028 total future conditions all through movements along Nutley Street and Maple Avenue would experience increased delay due to increased regional traffic growth.
8. The existing, background and future analysis scenarios indicate that the weekday AM, PM and Saturday peak hour vehicle queues would not be accommodated within existing turn lane bays.

RECOMMENDATIONS

In order to mitigate the traffic generated by the proposed mixed-use development, the following are recommended:

1. The site should be developed with the proposed access as currently illustrated on the Conceptual Development Plan (CDP) layout that removes the existing right-in/right-out site driveway on Maple Avenue to the subject property to reduce the number of existing curb cuts along Maple Avenue and improve access management.
2. The applicant should promote the pedestrian oriented and mixed-use characteristic of the development by establishing a quality streetscape with pedestrian amenities. Guidance will be provided by the recently approved pedestrian master plan and Maple Avenue Corridor (MAC) Zone guidelines. These include; wide sidewalks meeting or exceeding 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).
3. 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 Metrorail.
4. The applicant should coordinate the design of the site with Town staff so as to not preclude any Maple Avenue/Nutley Street signal improvements and/or possible future intersection modifications that may be completed by others.
5. The Town of Vienna promotes and encourages bicycling as an environmentally and healthy way to get around town and was recently designated as a Bicycle Friendly Community by the League of American Bicyclists. The applicant should incorporate and promote bicycling into the site design. These efforts should include providing both short term and long-term bicycle parking for the residents, employees, shoppers, and visitors to the site as well as improved non-motorized connectivity between the site and adjacent neighborhoods. Additionally, should Capital Bikeshare be expanded to the Town of Vienna, an area should be reserved for a future bikeshare station. In addition to widened sidewalks along the site's frontage, the applicant should consider a neighborhood bicycle/pedestrian connection to Millwood Court SW. This will provide access to Courthouse Road via Glen Avenue SW, a town identified bike route.

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. Although the trip threshold was not met the trips were sufficiently close to the threshold that VDOT was consulted along with Town staff in the scope and review of the traffic study.

Therefore, the purpose of this report is to assess any traffic related questions which may arise from Town staff, VDOT, and /or the neighboring community during the normal course of a review of a rezoning application. To that end, representatives of the development team met with VDOT and the Town of Vienna to identify the study scope and agree on specific study parameters. A copy of the executed 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 2016).
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 2022).
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 2022).
4. Identify development-related traffic impacts associated with the proposed new development, if any.
5. Provide an analysis of weekday AM, PM and Saturday peak hour traffic conditions six (6) years out from build out of the proposed new mixed-use development (year 2028).

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 Vienna, Development Associates LLC, Walsh Colucci Lubeley & Walsh PC, Walter Phillips, the Highway Capacity Manual 2000 (as reported by Synchro version 9.1), 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 VDOT, 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 where current counts were not already available.
5. Analyzed existing 2016 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). Trip estimates are based on standard Institute of Transportation Engineers (ITE) 9th edition, Trip Generation Manual rates and/or equations.
7. For year 2022, 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 2022 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 ITE 9th 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 2022.
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 2022.

13. Identified network improvements and/or transportation enhancements required to accommodate future traffic volumes with the proposed new uses.
14. Prepared weekday AM, PM and Saturday peak hour total future traffic forecasts based on the build out year of 2022 forecasts and an additional six (6) years of regional growth for a design year of 2028.
15. 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 2028.

STUDY METHODOLOGY

Synchro software (version 9.1) 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 2000 (HCM) reports generated by Synchro version 9.1. Level of service descriptions are included in Appendix C. The base Synchro files were obtained from the Town of Vienna. It should be noted that some minor adjustments were made to future conditions Synchro files to address errors and calibrations issues that will be specifically detailed later in the report.

STUDY AREA

This study was conducted in accordance with the parameters set forth in the executed April 2016 scoping document included in Appendix A that was agreed to by the Town of Vienna and VDOT 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. Nutley Street/Maple Avenue
2. Maple Avenue/Courthouse Road/Lawyers Road
3. Nutley Street/Roland Street
4. Maple Avenue/Right-in/right-out (RIRO) Driveway **[driveway removed with proposal]**
5. Maple Avenue/Full Movement Entrance
6. Nutley Street/Right-in/right-out (RIRO)
7. Nutley Street/Windover Avenue
8. Maple Avenue/ James Madison Drive

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

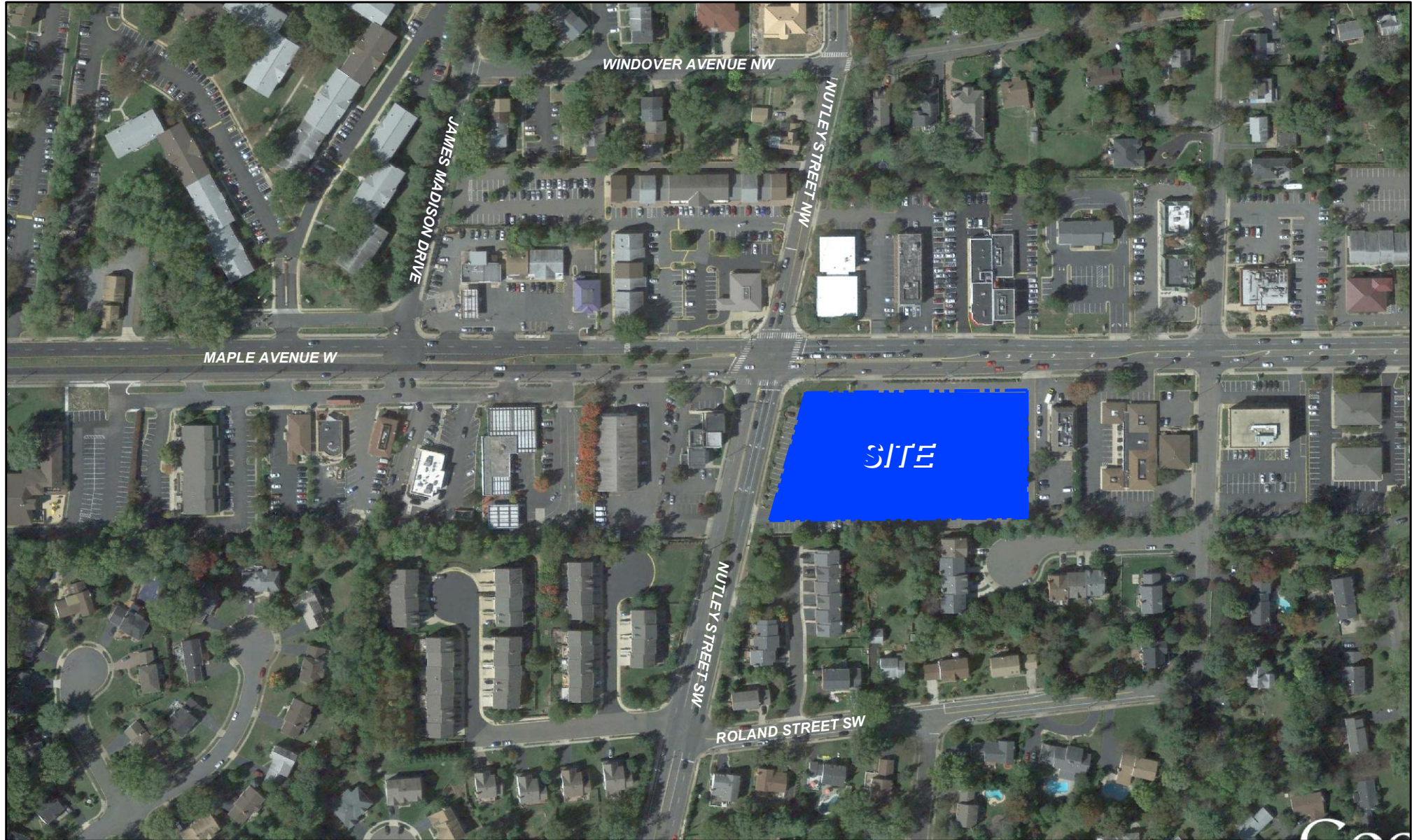


Figure 1-1
Site Area/Site Location Map

444 Maple
Town of Vienna



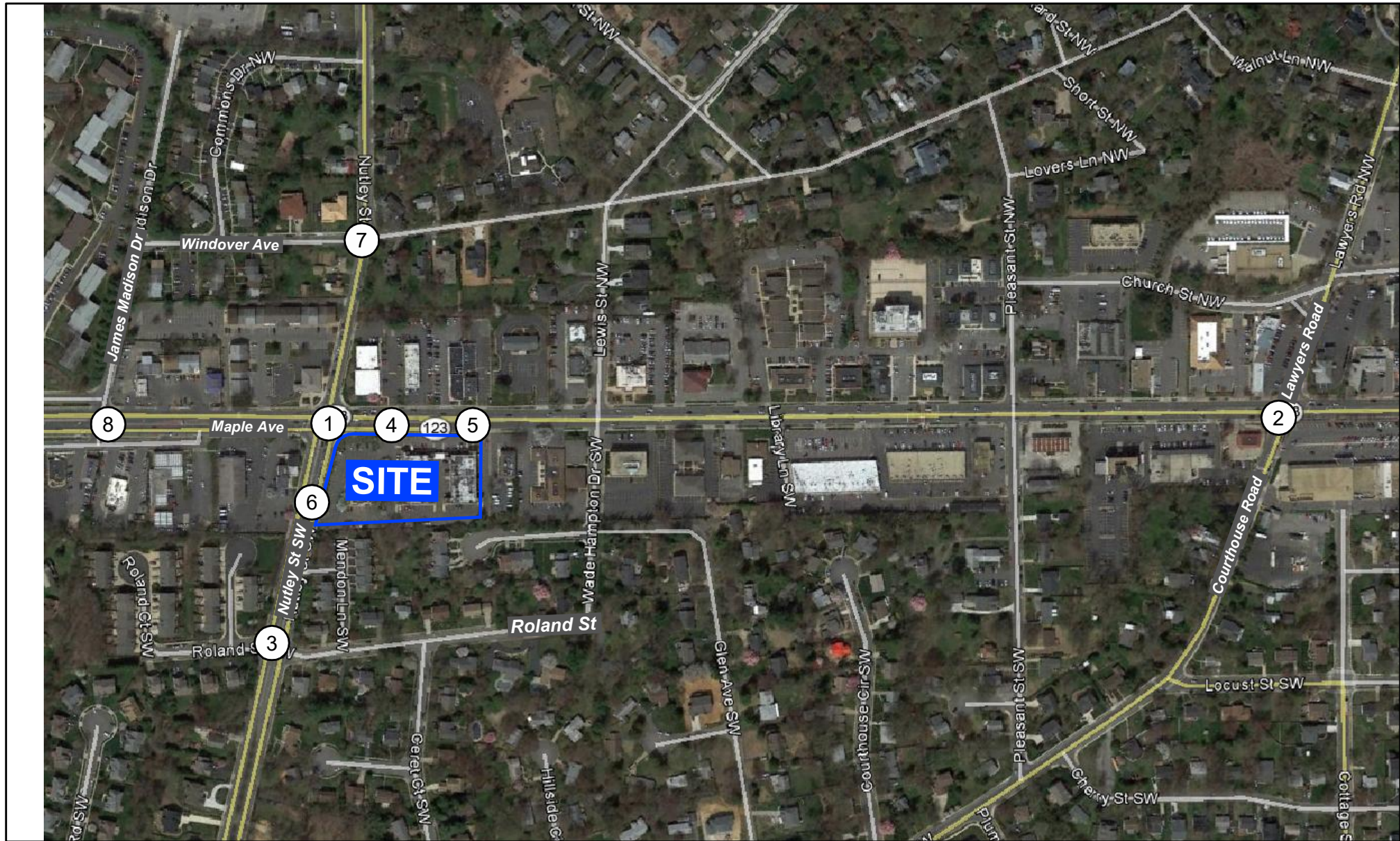


Figure 1-2
Study Intersections

444 Maple
Town of Vienna, Virginia



Section 2 BACKGROUND INFORMATION

SITE LOCATION/DESCRIPTION

Overview. The approximate 2.76-acre site is located in the southeast quadrant of the Nutley Street (Route 243) and Maple Avenue (Route 123) in the Town of Vienna, Virginia as shown on Figure 1-1. The application area is further identified as Fairfax County 2016 Tax Map 38-3 ((2)) 139, 140 & 141.

Project Description. The Applicant is proposing to develop the site with a mixed-use building comprised of approximately 160 multifamily dwelling units and 20,000 GSF of additional retail use. The site is currently developed with a 119 room hotel, the Vienna Wolf Trap Hotel, and a 3,500 gross square foot (GSF) sit down restaurant, Tequila Grande. All the existing buildings would be razed.

Site Access. Vehicular access to the subject property is currently provided via a right-in/right-out entrance along Nutley Street, a right-in/right-out on Maple Avenue as well as a full-movement entrance on Maple Avenue. The right-in/right-out along Maple Avenue would be removed with this application. A reduction of the proposed Conceptual Development Plan (CDP)/Final Development Plan (FDP) layout is provided on Figure 2-1. A full-size copy of the CDP/FDP layout is included as Appendix B.

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

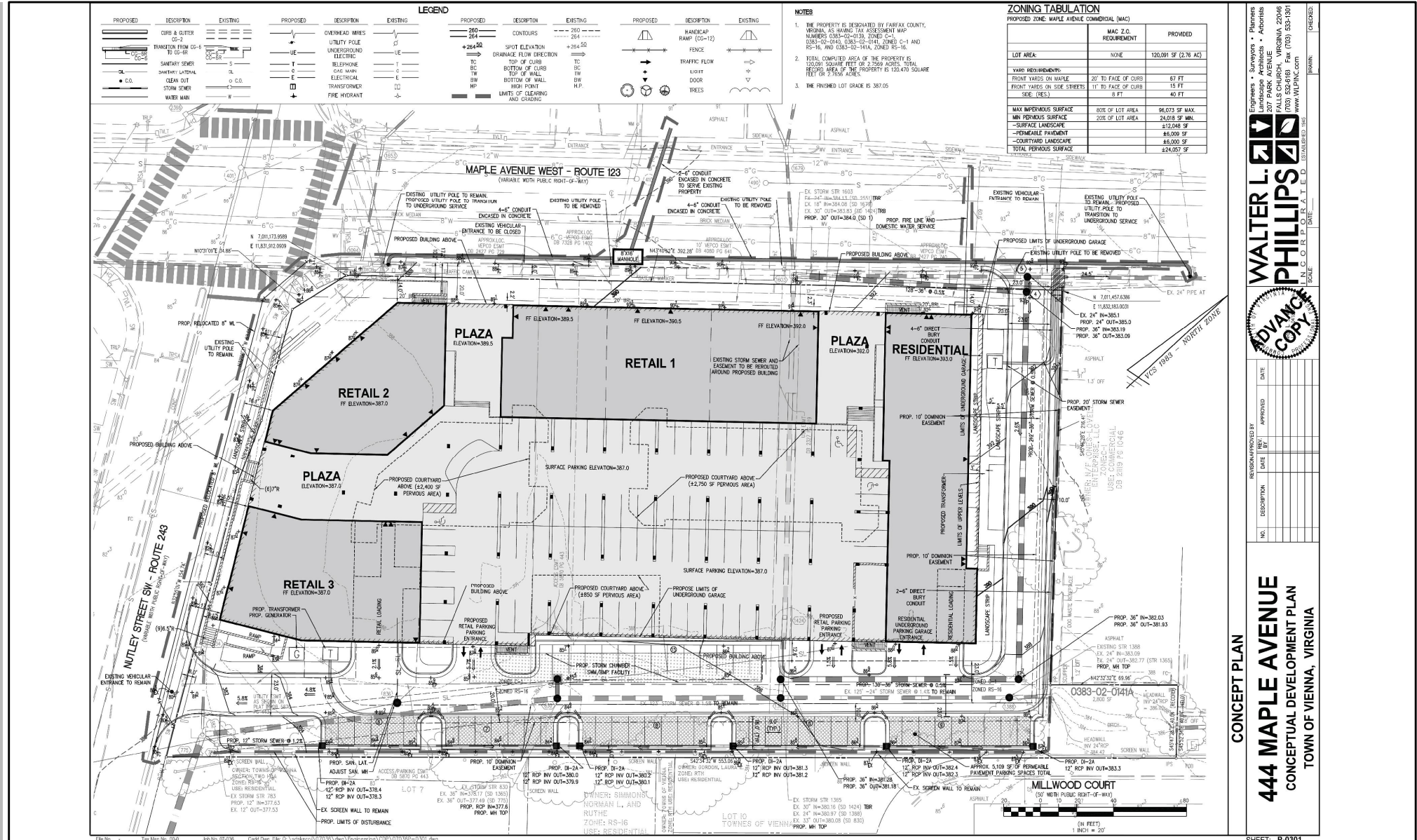
Existing Zoning. The site is currently zoned C-1 (Local Commercial), Figure 2-2 depicts the existing zoning associated with the subject site, as well as neighboring properties, all as reflected on Fairfax County’s 2016 zoning map.

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) across Nutley Street to the west, across Maple Avenue to the north, and immediately adjacent to the east
- RTH (Town House) immediately adjacent 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.



444 Maple
Town of Vienna



Figure 2-2
Existing Zoning Map

444 Maple
Town of Vienna



ROADWAY NETWORK

Existing Roadway Network.

Maple Avenue (VA Route 123) is a four-lane, divided, Urban Principal Arterial with a posted speed limit of 30 mph adjacent to the site. Maple Avenue in the area of the site carries 26,000 average daily trips. A traffic signal and turn lanes exist at the Nutley Street (VA 243) intersection. A center two way turn lane (TWTL) begins along Maple Avenue toward the eastern end of the site to facilitate left turns.

Nutley Street (VA Route 243) is a four-lane, divided, Urban Minor Arterial with a posted speed limit of 30 mph east of the Maple Avenue intersection and an Urban Collector with a speed limit of 30 mph to the west of the Maple Avenue intersection. Nutley Street in the area of the site carries 18,000 average daily trips.

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

Windover Avenue is a two-lane, undivided, Collector with a speed limit of 25 mph between James Madison Drive and Commons Drive NW and Major Collector with a speed limit of 25 mph between Commons Drive NW and Nutley Street NW. 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 1.2 miles from the Vienna/Fairfax-GMU Metrorail station (Orange Line). The immediate area is served by Fairfax Connector bus routes. Connector bus stops are currently located on Maple Avenue and Nutley Street along the perimeter of the property. They are placed on either side of these roadways. 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 466 (Vienna - Oakton). Fairfax Connector 466 provides weekday rush hour service circulating between Vienna Metro Station, Chain Bridge Road/James Madison Drive, White Granite Drive/Flagpole Lane, and Bushman Drive/Oakwood Chase Court. Headways are typically 30 to 40 minutes. Additional route information is provided in Appendix D.

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/Nutley Street crosswalks with pedestrian countdown signal heads are provided on all legs of the intersection. In the vicinity of the site BikeFairfax identifies Courthouse Road as the preferred bicycle route. Courthouse Road generally parallels Maple Avenue south of Nutley Street and then bends to intersect with Maple Avenue approximately a one-half mile north of Nutley Street.

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

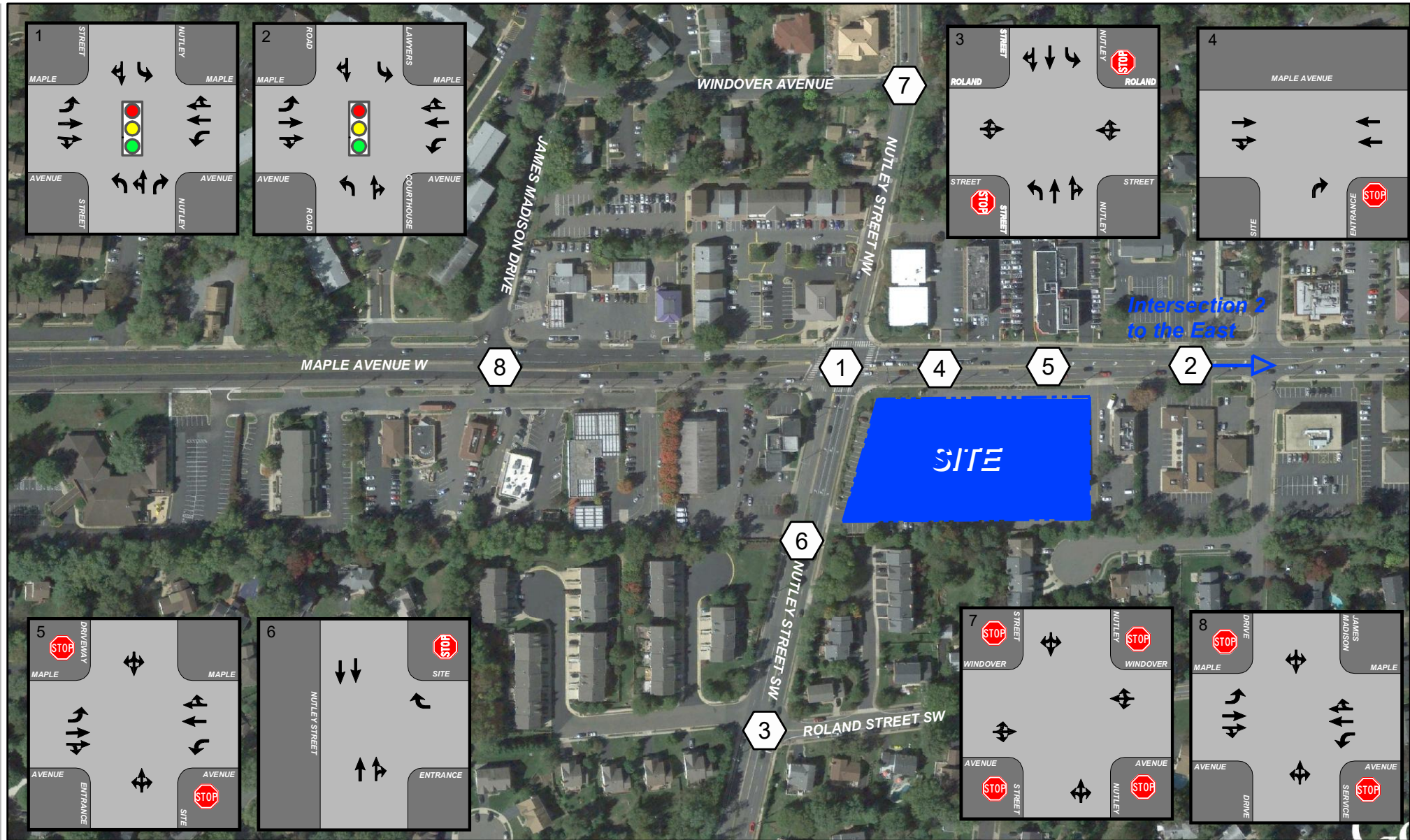


Figure 2-3
Existing Lane Use and Traffic Control

444 Maple
Town of Vienna

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign



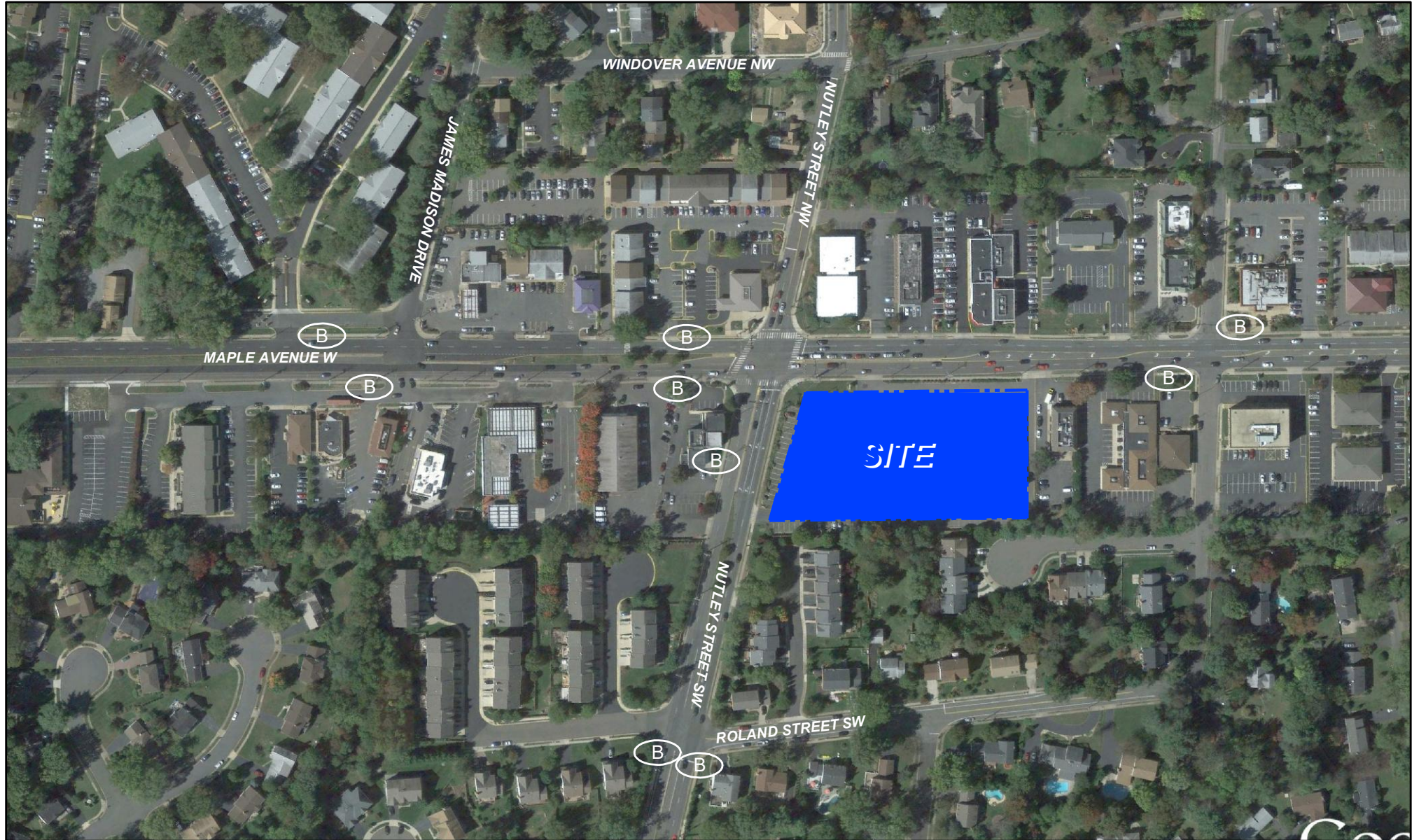


Figure 2-4
Existing Bus Stop Locations

ⓑ Represents Bus Stop

444 Maple
Town of Vienna



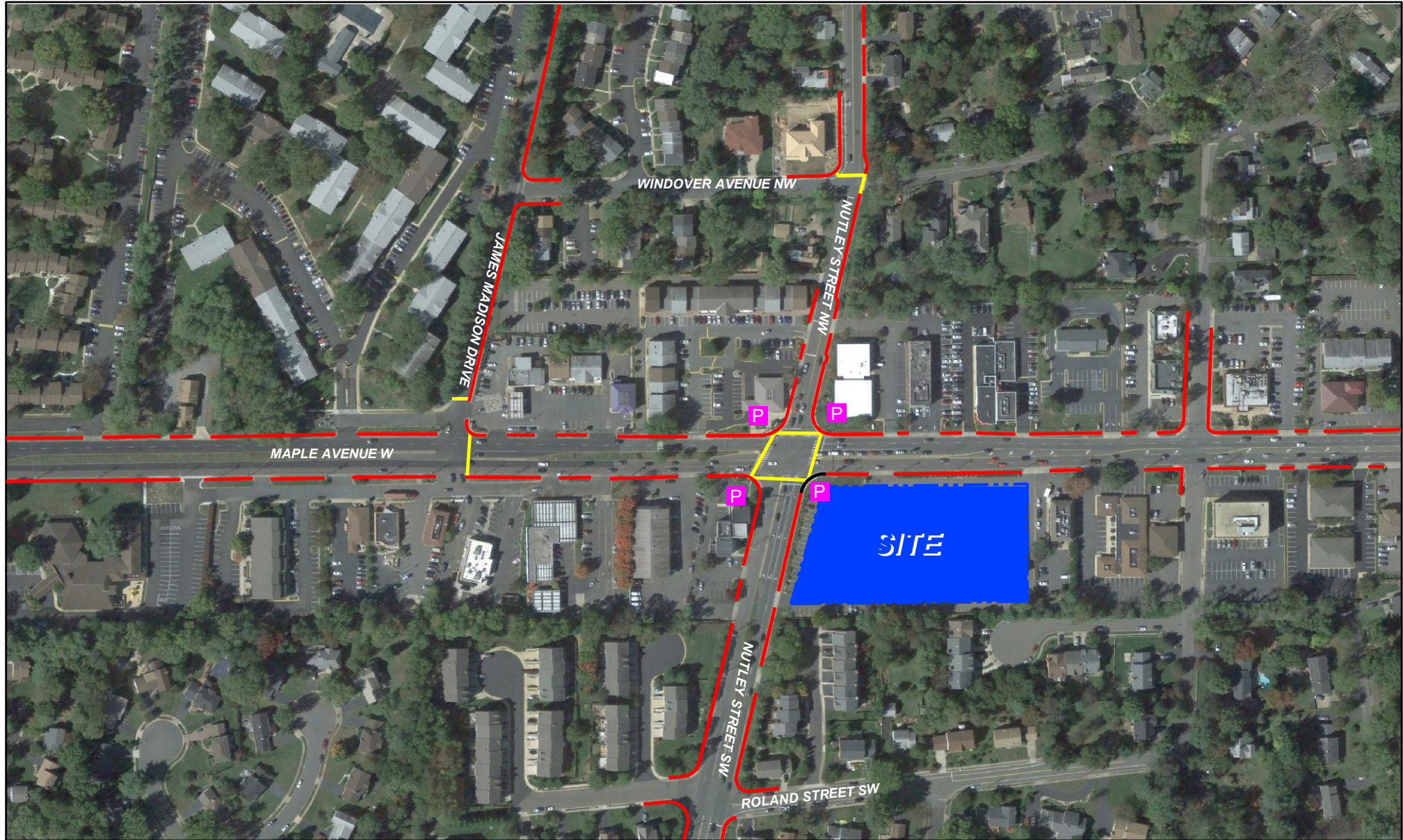


Figure 2-5
Existing Pedestrian Facilities

444 Maple
Town of Vienna, Virginia

P Pedestrian Crossing Signal

— Concrete Sidewalk
— Marked Crosswalk



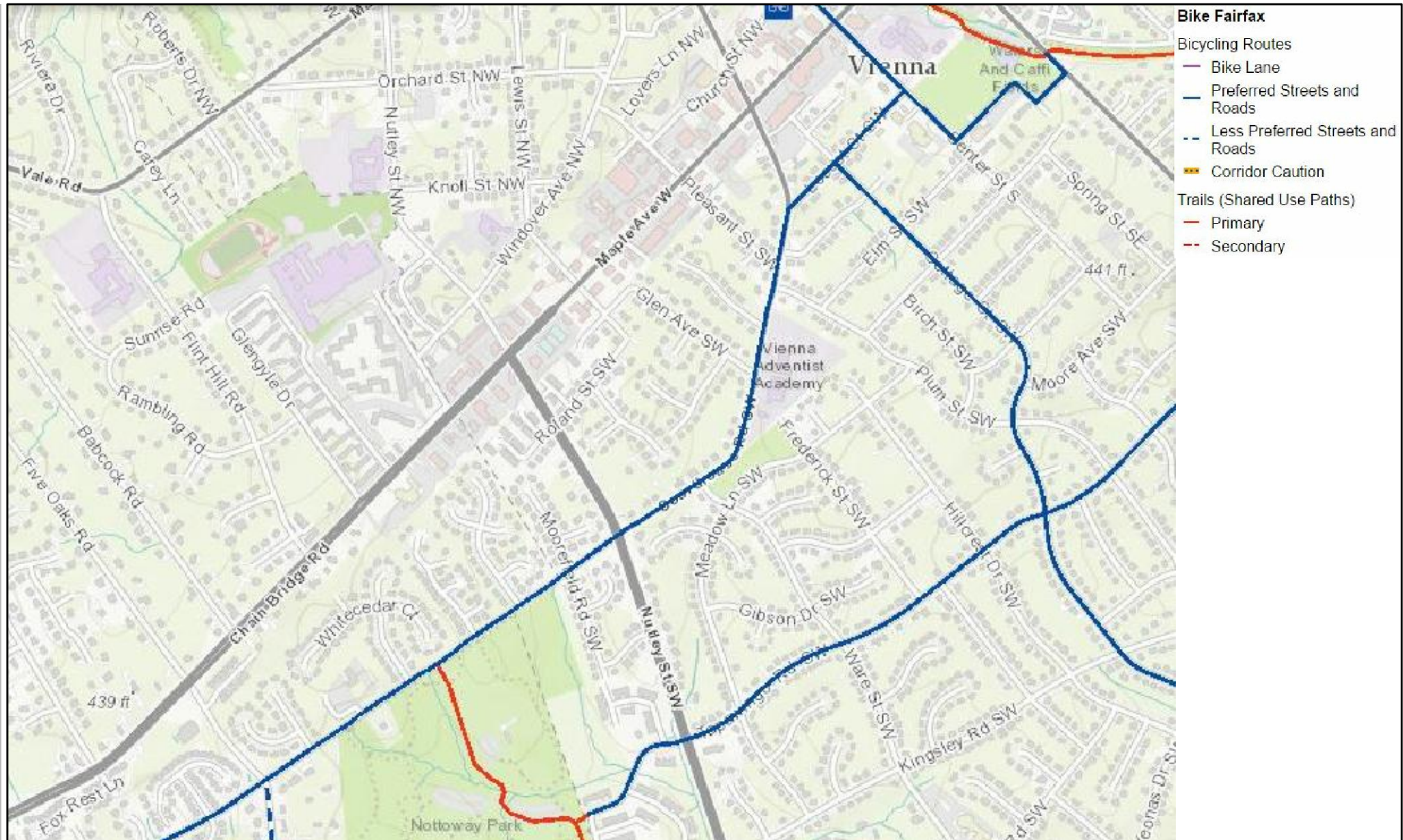


Figure 2-6
Existing Bicycle Facilities

444 Maple
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 and pedestrian traffic counts at the following locations:

1. Nutley Street/Maple Avenue
2. Maple Avenue/Courthouse Road/Lawyers Road
3. Nutley Street/Roland Street
4. Maple Avenue/Right-in/right-out (RIRO) Driveway
5. Maple Avenue/Full Movement Entrance
6. Nutley Street/Right-in/right-out (RIRO)
7. Nutley Street/Windover Avenue [conducted with Flagship Car Wash Project]
8. Maple Avenue/ James Madison Drive [conducted with Flagship Car Wash Project]

Traffic counts were conducted on Tuesday, April 26, 2016 and Saturday April 30, 2016 for all the study intersections listed above with the exception of the Nutley Street/Windover Avenue on Thursday, March 31, 2016 and Maple Avenue/ James Madison Drive on Tuesday, January 27, 2015 and Saturday, January 31, 2015 conducted in association with the Flagship Car Wash project conducted by Wells + Associates. Traffic counts were conducted between the hours of 6:00 AM - 9:00 AM and 4:00 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). Existing counts utilized from other studies 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 counts at each location are summarized on Figure 3-2.

It should be noted that during the Saturday data collection for the Maple Avenue/Courthouse Road/Lawyers Road study intersection paving was being conducted on the southbound approach. To account for this, overall intersection volumes collected during the peak period were redistributed consistent with the distributions observed during the PM peak hour.

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 2015 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 2000* as reported by Synchro version 9.1. 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 3-3.

Results. The results of the existing intersection capacity analyses indicate the signalized Nutley

Street/Maple Avenue intersection currently operates at an overall level of service (LOS “E” or better) during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections and driveways that serve the site have traffic movements that operate at LOS “C” 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, a number of 95th percentile queues extend past the available effective storage in the existing condition.

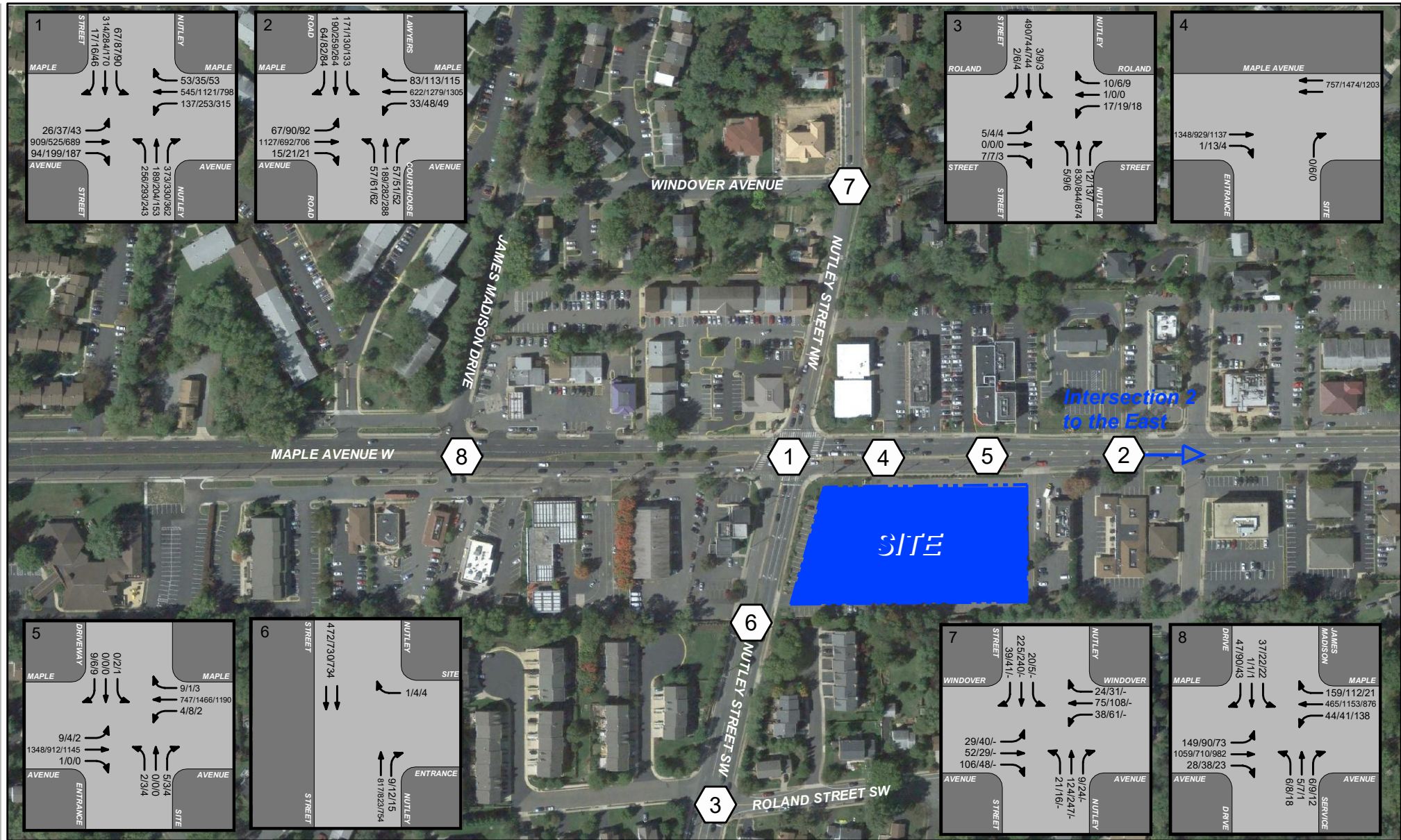


Figure 3-1
Existing Peak Hour Traffic Volumes

444 Maple
Town of Vienna, Virginia

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



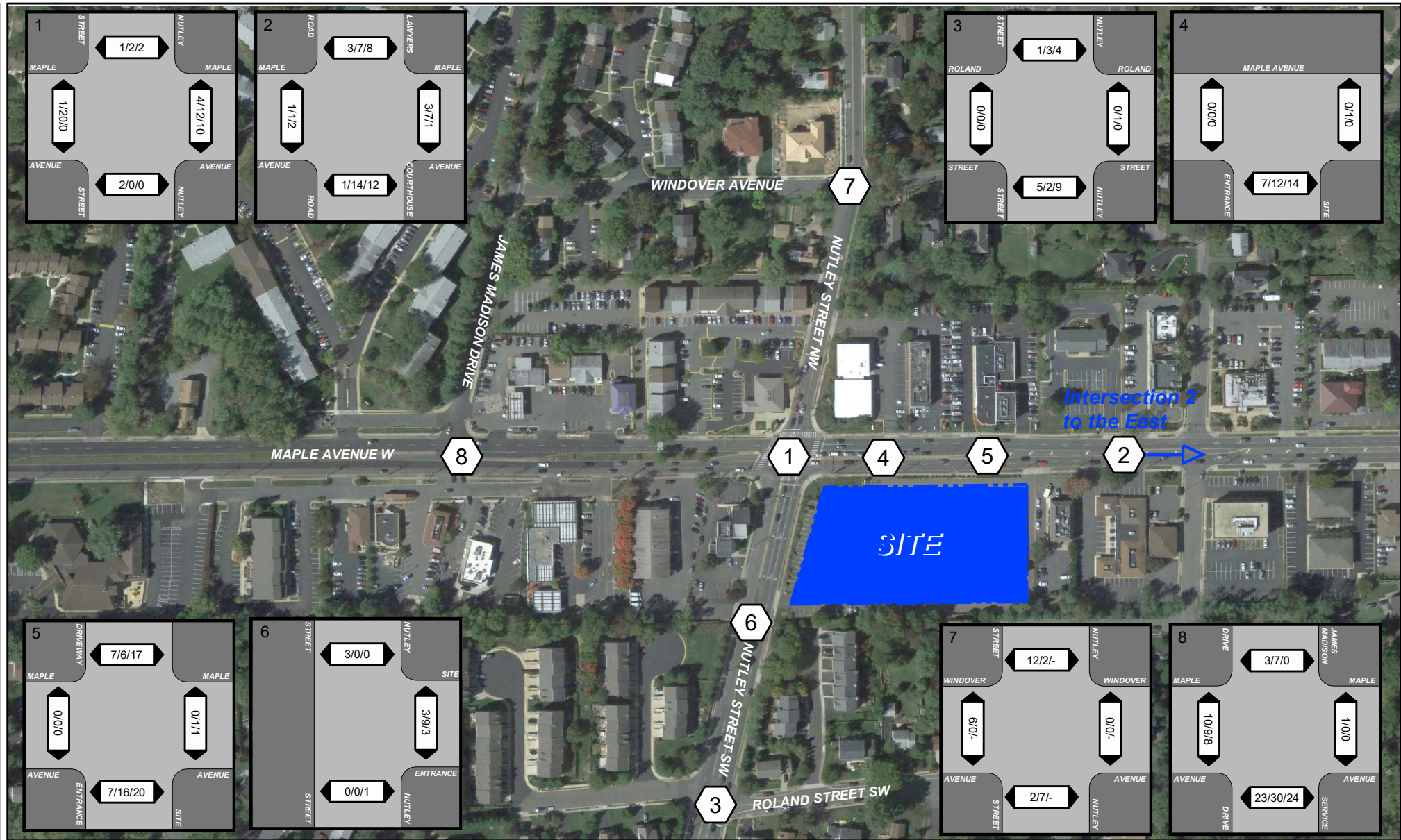


Figure 3-2
Existing Peak Hour Pedestrian Volumes

444 Maple
Town of Vienna, Virginia

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



Table 3-1
444 Maple
Existing Intersection Levels of Service Summary (1) (2) (3) (4)

Intersection	Approach Roadway	Operating Condition	Approach/ Movement	AM	Existing PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	C (28.6)	D (40.8)	D (35.8)
			EBTR	F (81.0)	D (50.8)	F (139.5)
	Maple Avenue		WBL	D (50.4)	D (52.1)	D (52.0)
			WBTR	C (32.6)	D (53.5)	C (34.6)
	Nutley Street		NBL	E (68.1)	F (95.8)	E (66.4)
			NBLT	E (67.8)	F (95.5)	E (65.9)
	Nutley Street		NBR	D (44.8)	D (39.6)	C (27.2)
			SBL	D (49.7)	E (58.4)	D (54.0)
			SBTR	F (154.6)	F (120.6)	E (73.4)
			Overall	E (71.2)	E (63.5)	E (72.6)
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Signal	EBL	E (69.2)	F (106.4)	E (68.6)
			EBTR	D (38.6)	C (27.9)	C (27.6)
	Maple Avenue		WBL	E (67.5)	F (80.3)	E (68.8)
			WBTR	C (29.9)	E (59.7)	F (100.8)
	Courthouse Road		NBL	E (77.1)	F (80.7)	E (73.7)
			NBTR	E (73.5)	F (123.3)	F (103.5)
	Lawyers Road		SBL	F (104.1)	F (89.4)	E (75.4)
			SBTR	D (49.4)	E (68.8)	E (57.5)
			Overall	D (46.4)	E (63.6)	E (76.5)
3 Nutley Street/ Roland Street	Rowland Street	STOP	EBLTR	C [15.9]	C [17.6]	C [18.8]
			WBLTR	C [23.0]	D [30.7]	C [23.5]
	Nutley Street		NBL	A [9.1]	A [9.8]	A [9.5]
			NBTR	A [0.0]	A [0.0]	A [0.0]
	Nutley Street		SBL	A [9.5]	A [9.2]	A [9.0]
			SBTR	A [0.0]	A [0.0]	A [0.0]
	Maple Avenue	STOP	EBTR	A [0.0]	A [0.0]	A [0.0]
			WBTR	A [0.0]	A [0.0]	A [0.0]
	Site Entrance		NBR	A [0.0]	A [9.1]	C [17.8]
5 Site entrance/ Maple Avenue	Maple Avenue	STOP	EBTR	A [0.3]	A [0.3]	A [0.1]
			WBTR	A [0.2]	A [0.3]	A [0.1]
	Maple Avenue		NBLTR	B [13.3]	B [14.6]	C [15.1]
			SBLTR	B [11.2]	C [21.8]	C [15.2]
	Site Entrance Driveway					
	Site Entrance	STOP	WBR	B [11.5]	A [9.1]	A [9.0]
			NBTR	A [0.0]	A [0.0]	A [0.0]
	Nutley Street		SBTR	A [0.0]	A [0.0]	A [0.0]
7 Nutley Street/ Windover Avenue	Windover Avenue	ALL WAY STOP	EBLTR	B [10.3]	B [10.5]	-
			WBLTR	B [10.1]	B [12.0]	-
	Windover Avenue		NBLTR	B [10.2]	B [13.2]	-
			SBLTR	B [12.0]	B [13.1]	-
	Nutley Street		Overall	B [10.9]	B [12.5]	-
	Maple Avenue	STOP	EBL	A [9.2]	B [11.1]	A [9.7]
			EBTR	A [0.0]	A [0.0]	A [0.0]
	Maple Avenue		WBL	B [11.7]	A [9.7]	B [12.4]
			WBTR	A [0.0]	A [0.0]	A [0.0]
8 James Madison Drive/ Maple Avenue	Maple Avenue		NBLTR	F [10.1]	F [13.7]	F [254.6]
			SBLTR	F [92.4]	F [91.3]	F [47.5]
	Driveway					
	James Madison Drive					
	Maple Avenue					
	Maple Avenue					

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) Asterisks * represent delays in excess of 999.9 seconds.
(4) Roadway names in bold are considered north/south for purposes of this analysis

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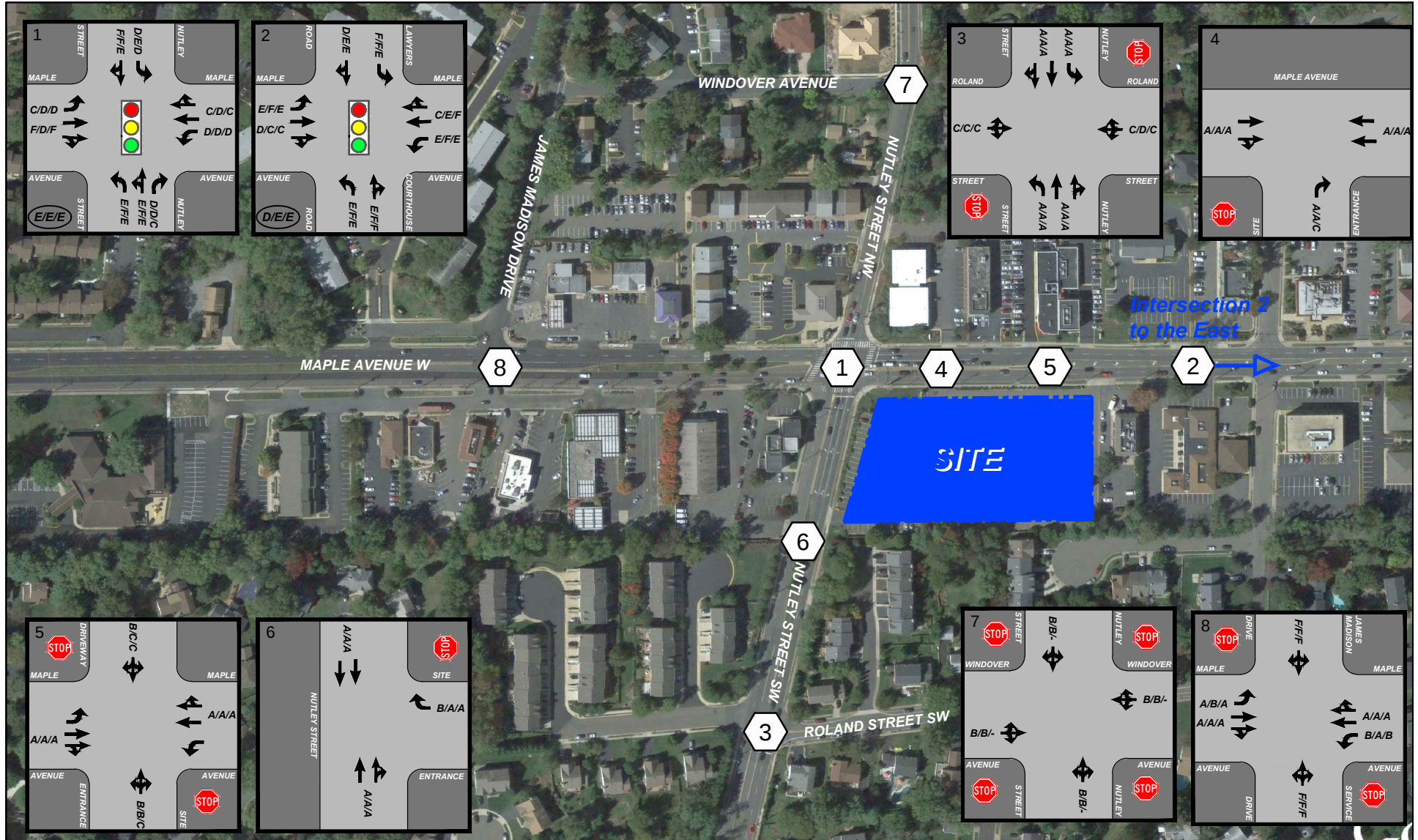


Figure 3-3
Existing Levels of Service

444 Maple
Town of Vienna

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign



Table 3-2
444 Maple
Existing Intersection Queuing Summary (1) (2) (3)

Intersection	Approach Roadway	Operating Condition	Approach/ Movement	Available Storage (ft)	AM	Existing PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	90	34	43	49
			EBTR	n/a	718	447	693
	Maple Avenue		WBL	285	217	306	511
			WBTR	n/a	315	745	495
	Nutley Street		NBL	220	310	458	276
Nutley Street			NBLT	n/a	321	475	284
			NBR	n/a	227	201	179
			SBL	200	106	153	136
			SBTR	n/a	573	601	293
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Signal	EBL	160	119	204	148
			EBTR	n/a	647	365	342
	Maple Avenue		WBL	145	68	100	92
			WBTR	n/a	334	989	1023
	Courthouse Road		NBL	230	106	125	111
			NBTR	n/a	376	644	594
	Lawyers Road		SBL	245	318	238	204
			SBTR	n/a	323	539	512
3 Nutley Street/ Roland Street	Rowland Street	STOP	EBLTR	n/a	3	3	2
	Rowland Street		WBLTR	n/a	11	15	11
	Nutley Street		NBL	165	1	1	1
			NBTR	n/a	0	0	0
	Nutley Street		SBL	145	0	1	0
			SBTR	n/a	0	0	0
4 RiRo/ Maple Avenue	Maple Avenue	STOP	EBTR	n/a	0	0	0
	Maple Avenue		WBT	n/a	0	0	0
	Site Entrance		NBR	n/a	0	1	1
5 Site entrance/ Maple Avenue	Maple Avenue	STOP	EBTR	n/a	1	1	0
	Maple Avenue		WBTR	n/a	1	1	0
	Site Entrance		NBLTR	n/a	1	1	2
	Driveway		SBLTR	n/a	1	3	2
6 Nutley Street/ Site entrance	Site Entrance	STOP	WBR		0	0	0
	Nutley Street		NBTR	n/a	0	0	0
	Nutley Street		SBT	n/a	0	0	0
7 Nutley Street/ Windover Avenue	Windover Avenue	ALL WAY	EBLTR	n/a	n/a	n/a	n/a
	Windover Avenue	STOP	WBLTR	n/a	n/a	n/a	n/a
	Nutley Street		NBLTR	n/a	n/a	n/a	n/a
	Nutley Street		SBLTR	n/a	n/a	n/a	n/a
8 James Madison Drive/ Maple Avenue	Maple Avenue	STOP	EBL	205	14	12	8
			EBTR	n/a	0	0	0
	Maple Avenue		WBL	145	7	4	23
			WBTR	n/a	0	0	0
	Driveway		NBLTR	n/a	33	45	81
	James Madison Drive		SBLTR	n/a	107	133	112

Notes: (1) Turning movement queue length is based on the 95th percentile queue in feet as reported by Synchro, Version 9.
(2) Roadway names in bold are considered north/south for purposes of this analysis
(3) Queues for All Way STOPs (Nutley Street/Windover Avenue) not reported by Synchro

Section 4

2022 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 and VDOT staff to be 1.0 percent per year compounded for through movements along Maple Avenue and Nutley Street and the turning movements at that intersection. The resulting regional growth volumes are shown on Figure 4-1.

PIPELINE TRIPS

Traffic from two (2) pipeline developments were included to obtain the 2022 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, 2016, the Vienna Town Council unanimously approved Rezoning PF-40-15-PMAC for the subject property. The development would include:
 - Car Wash
 - Fast-food Restaurant with Drive-thru of 5,001 GSF
- 2) Maple Avenue Consolidation [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 would include:
 - Retail uses of approximately 26,000 GSF
 - 49 Townhouse style units

Although both Staff and Planning Commission recommended approval of the rezoning the Vienna Town Council was unable to achieve supermajority vote on June 6, 2016. *Despite the project being unapproved it was considered as a pipeline background project to account for a potential redevelopment of the site in the near future.*

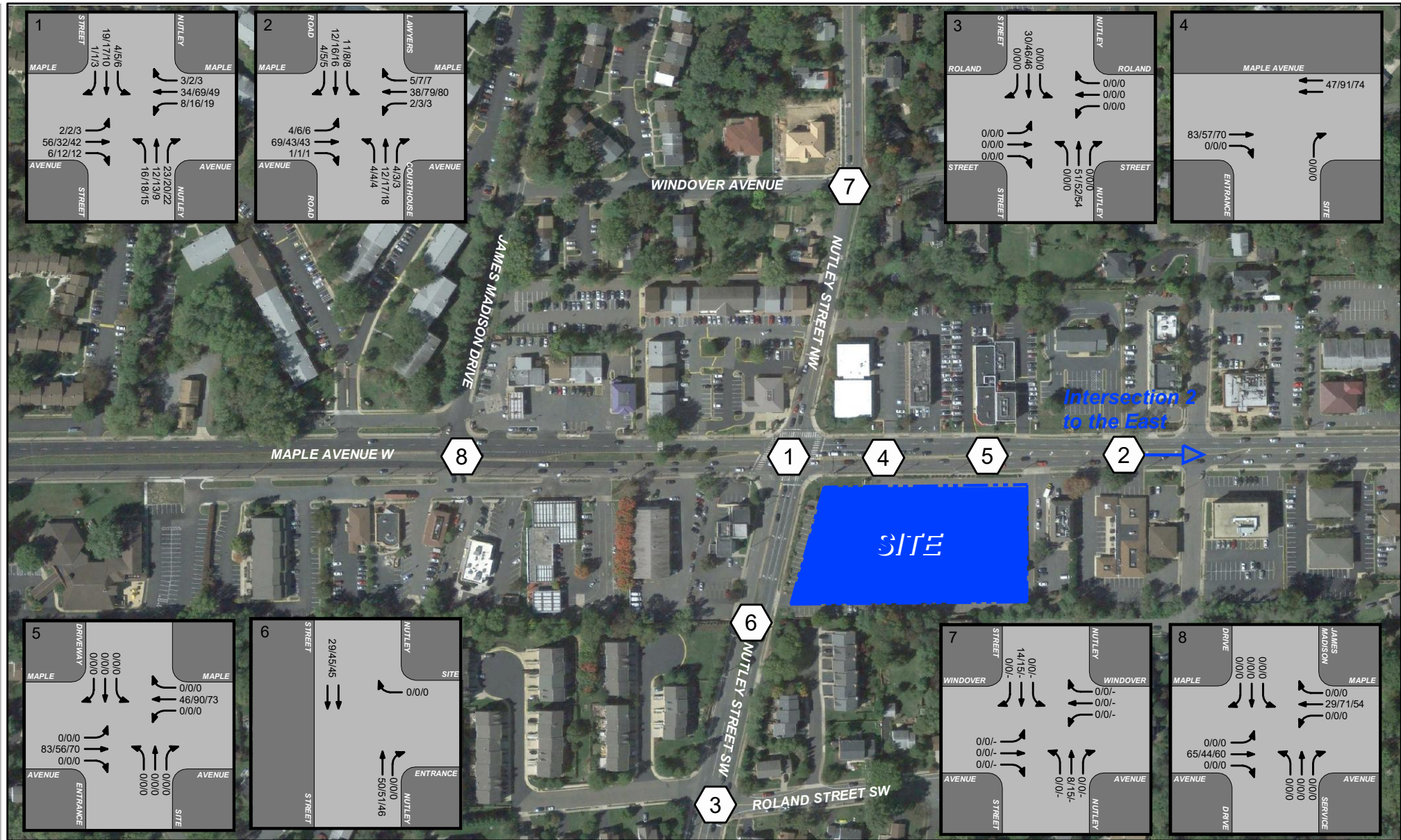


Figure 4-1
2022 Regional Traffic Growth

444 Maple
Town of Vienna, Virginia

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



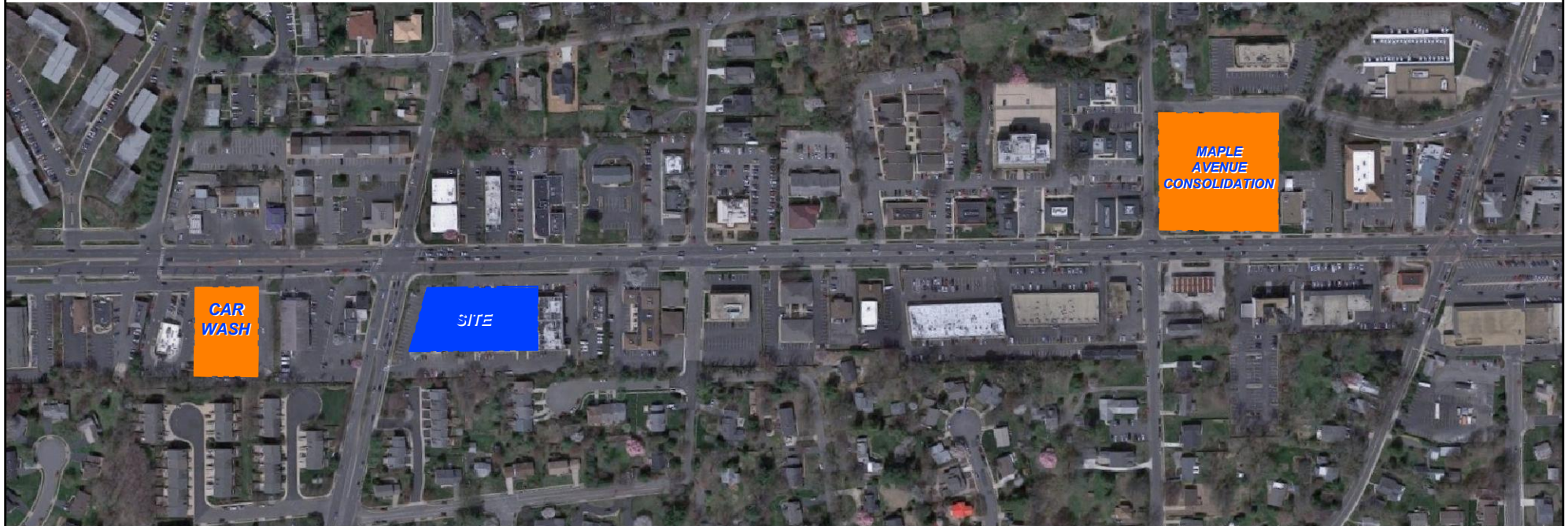


Figure 4-2
Location of Pipeline Developments

444 Maple
Town of Vienna, Virginia



Table 4-1
444 Maple
Pipeline Trip Generation Analysis¹

Land Use	Land Use Code	Size	Units	AM Peak Hour		PM Peak Hour		Weekday ADT	Saturday Peak Hour	
				In	Out	In	Out		In	Out
Marco Polo Site										
ITE - Shopping Center	820	26,000	SF	43	26	117	126	2,829	189	175
Internal Capture (5% AM, 10% PM, 15% ADT)				(11)	0	(11)	(21)	(52)	(2)	(3)
				42	26	116	124	2,777	187	172
Pass-by Reduction (25%)				(11)	(7)	(29)	(31)	(694)	(47)	(43)
Retail Subtotal				31	19	87	93	2,083	140	129
Townhouses	230	49	DU	5	24	22	11	346	28	23
Internal Capture (5% AM, 10% PM, 15% ADT)				0	(11)	(2)	(11)	(52)	(3)	(2)
Residential Subtotal				5	23	20	10	294	25	21
Total Trips				36	42	107	103	2,377	165	150
Flagship Car Wash & Restaurant										
Car Wash				1	0	31	32	630	84	90
Fast-food Restaurant with Drive-thru	934	5,001	SF	116	112	85	79	2,482	151	145
Pass-By Trip Reduction				(59)	(57)	(40)	(37)		(71)	(68)
Diverted Link Trip Reduction				(32)	(31)	(20)	(18)		(35)	(33)
Restaurant New Primary				24	24	26	24		45	44
Total Trips				117	112	116	111	3,112	235	235

Note(s):

1. Trip generation for Marco Polo Site consistent with TIA performed by Wells + Associates and dated March 17, 2016
2. Trip generation for Flagship Car Wash & Restaurant consistent with TIA performed by Wells + Associates and dated April 6, 2016

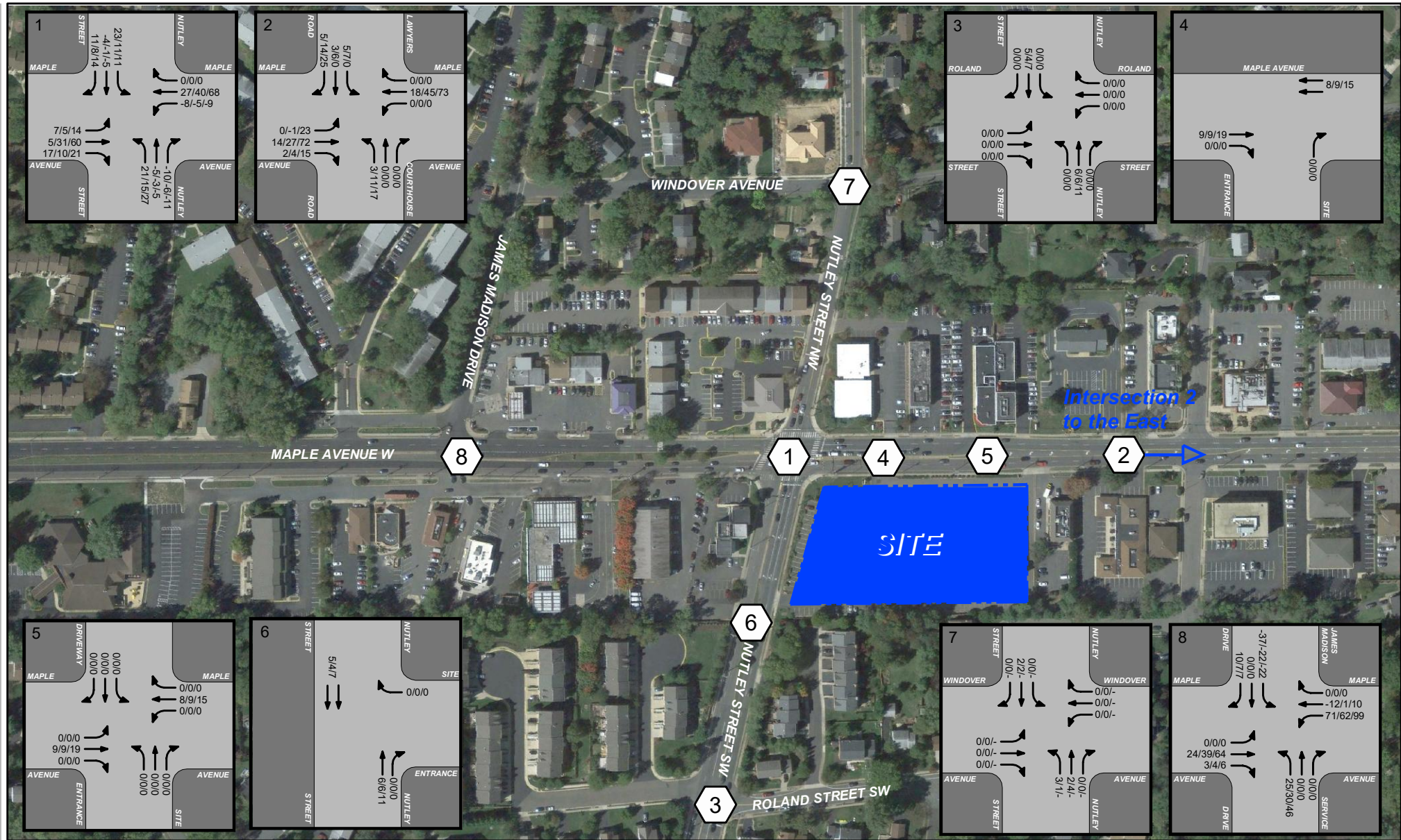


Figure 4-3
Total Pipeline Trip Assignments

444 Maple
Town of Vienna, Virginia

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



TOTAL BACKGROUND FUTURE TRAFFIC FORECASTS

Background future traffic forecasts (without the proposed development) were developed for the forecast year of 2022. 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 2022 are provided on Figure 4-4.

TRANSPORTATION IMPROVEMENTS BY OTHERS

Several unbuilt/incomplete programmed transportation improvements (as of the date of the existing traffic counts) were identified for inclusion within the study area for the background and total future conditions analyses. The following outlines those improvements assumed complete by year 2022:

- Flagship Carwash (Rezoning PF-40-15-PMAC). Proffers dated May 2, 2016 provided that “subject to VDOT and Town approval, Applicant shall design and construct a HAWK (High Intensity Activated Crosswalk) beacon at the Maple Avenue pedestrian crosswalk, and construct other improvements relating to pedestrian access”.
- An optimization of signal timings along Maple Avenue was provided by the Town and included in the background future and total future analyzes. Among the improvements are cycle length adjustments and offset optimization. It should be noted that to account for a minimum error in timings provided by the town timings were adjusted slightly in this analysis to correct those errors.

The background future lane use and traffic controls assumed under background conditions that incorporate those transportation improvements and assumptions listed above are shown on Figure 4-5.



444 Maple
Town of Vienna, Virginia



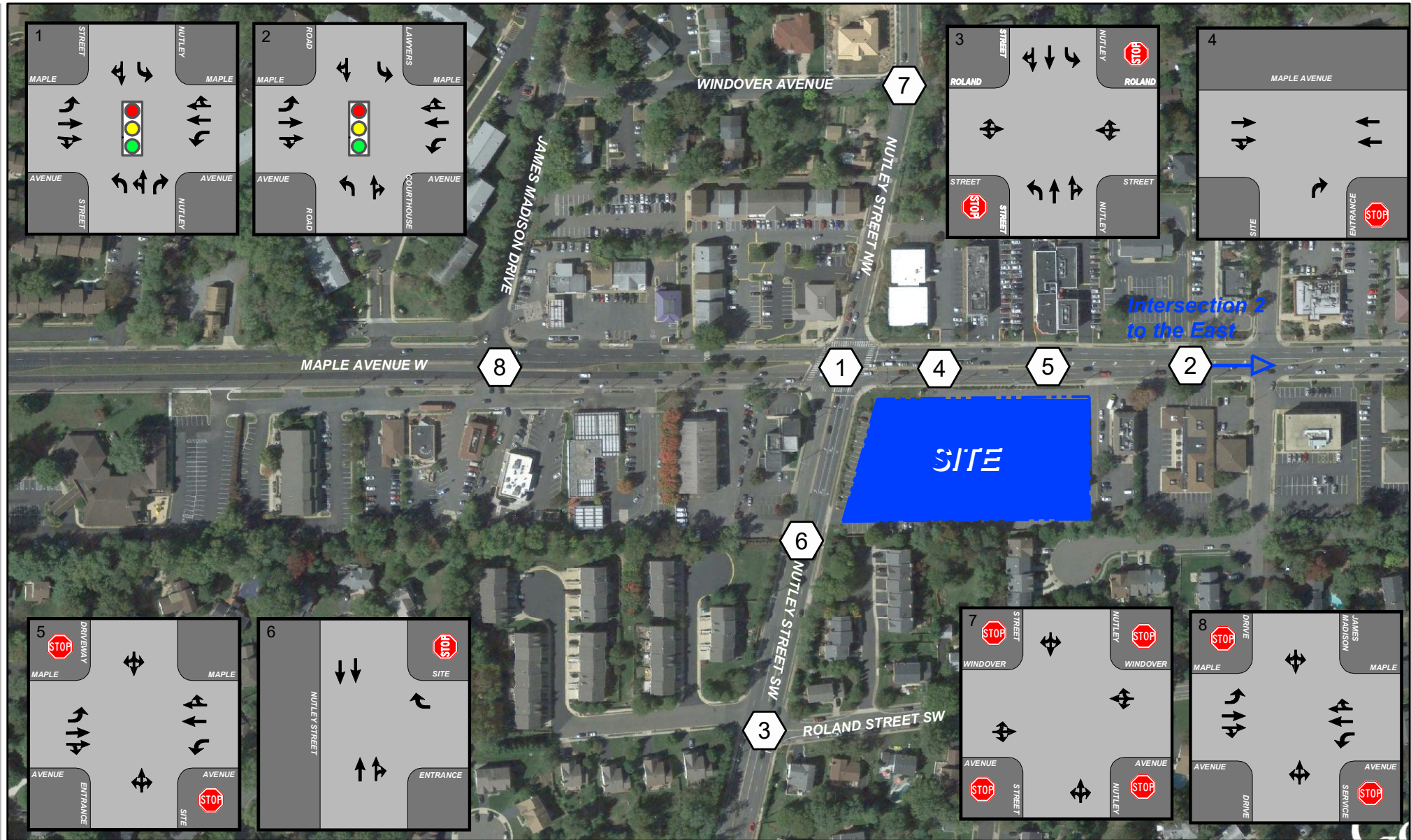


Figure 4-5
2022 Background Future Lane Use and Traffic Controls

444 Maple
Town of Vienna

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign



OPERATIONAL ANALYSIS

The total background future (without proposed development) capacity analyses for year 2022 were performed at the study intersections based on the background future traffic forecasts shown on Figure 4-4 and the future background lane use and traffic controls shown on Figure 4-5. The results of the background future conditions analyses are presented in Appendix G and summarized in Table 4-1. The results are also summarized graphically on Figure 4-6.

Results. The results of the background future (without the proposed development) intersection capacity analyses indicate the signalized Nutley Street/Maple Avenue intersection continues to operate at an overall level of service (LOS “E” or better) during the weekday AM and PM peak hours. The Saturday peak hour will degrade to overall LOS “F” due to regional growth and pipeline traffic. In addition it is expected that pedestrian safety in the vicinity of the Maple Avenue/James Madison Drive intersection would improve with the inclusion of the HAWK signal. All the STOP controlled intersections and driveways that serve the site have traffic movements that operate at LOS “C” or better in the AM, PM and Saturday peak hours.

QUEUEING ANALYSIS

A queueing analysis was conducted for 2022 background conditions at the study intersections and compared to the queueing analysis completed for existing conditions. The results are summarized in Table 4-2. Queue reports are also provided in Appendix G. As shown on Table 3-2, a number of 95th percentile queues extend past the available effective storage in the background total future (without the proposed) condition consistent with existing conditions.

Table 4-2
444 Maple
Background Future Intersection Levels of Service Summary (1) (2) (3) (4)

Intersection	Approach Roadway	Operating Condition	Approach/ Movement	AM	Existing PM	SAT	Background 2022		
							AM	PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	C (28.6)	D (40.8)	D (35.8)	C (28.5)	D (42.5)	D (38.6)
			EBTR	F (81.0)	D (50.8)	F (139.5)	F (86.1)	D (53.1)	F (208.1)
	Maple Avenue		WBL	D (50.4)	D (52.0)	D (52.0)	E (68.7)	F (67.2)	E (67.3)
			WBTR	C (32.6)	D (53.5)	C (34.6)	C (27.7)	C (32.3)	C (21.6)
	Nutley Street		NBL	E (68.1)	F (95.8)	E (66.4)	E (66.4)	F (120.8)	E (55.1)
			NBLT	E (67.8)	F (95.5)	E (65.3)	E (65.3)	F (120.4)	D (54.8)
	Nutley Street		NBR	D (44.8)	D (39.6)	C (22.2)	D (22.6)	D (54.6)	A (5.8)
			SBL	D (49.7)	E (58.4)	D (54.0)	D (50.6)	E (59.7)	D (53.6)
	Overall		SBLT	E (154.6)	F (120.6)	E (73.4)	E (157.5)	E (145.5)	E (76.0)
			Overall	E (71.2)	E (63.5)	E (72.6)	E (69.1)	E (66.6)	F (86.8)
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Signal	EBL	E (69.2)	F (106.4)	E (68.6)	E (77.9)	F (120.9)	D (54.5)
			EBTR	D (38.6)	C (27.9)	C (27.6)	C (22.2)	B (16.7)	C (29.8)
	Maple Avenue		WBL	E (67.5)	F (80.3)	E (68.8)	E (67.1)	E (74.2)	E (73.2)
			WBTR	C (29.9)	E (59.7)	F (100.8)	C (27.2)	F (85.2)	F (151.7)
	Courthouse Road		NBL	E (77.1)	F (80.7)	F (73.7)	F (85.2)	F (87.5)	E (74.0)
			NBLT	E (73.5)	F (123.3)	F (103.5)	E (78.2)	F (139.2)	F (140.5)
	Lawyers Road		SBL	F (104.1)	F (89.4)	E (75.4)	F (105.2)	F (96.5)	E (76.7)
			SBLT	D (49.4)	E (68.8)	E (57.5)	D (49.0)	F (86.3)	F (89.8)
	Overall		Overall	D (46.4)	E (63.6)	E (76.5)	D (39.9)	E (76.5)	F (105.5)
3 Nutley Street/ Roland Street	Rowland Street	STOP	EBLTR	C (15.9)	C (17.6)	C (18.8)	C (15.1)	C (17.7)	C (23.4)
			WBLT	C (23.0)	D (30.7)	C (23.5)	C (22.4)	D (30.8)	D (31.6)
	Nutley Street		NBL	A [9.1]	A [9.8]	A [9.5]	A [9.1]	A [9.7]	A [9.7]
			NBLT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	Nutley Street		SBL	A [9.5]	A [9.2]	A [9.0]	A [9.4]	A [9.3]	A [9.6]
			SBLT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	4 R/Ro/ Maple Avenue	STOP	EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
			WBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	Site Entrance		NBR	A [0.0]	A [9.1]	C [17.8]	A [0.0]	A [9.3]	C [19.8]
5 Site entrance/ Maple Avenue	Maple Avenue	STOP	EBTR	A [0.3]	A [0.3]	A [0.1]	A [0.4]	A [0.3]	A [0.1]
			WBTR	A [0.2]	A [0.3]	A [0.1]	A [0.2]	A [0.3]	A [0.1]
	Site Entrance		NBLT	B [13.3]	B [14.6]	C [15.1]	B [14.4]	C [15.2]	C [16.4]
			SBLT	B [11.2]	C [21.8]	C [15.2]	B [11.5]	C [24.1]	C [16.2]
	6 Nutley Street/ Site entrance	STOP	WBR	B [11.5]	A [9.1]	A [9.0]	A [9.8]	A [9.1]	A [9.5]
			NBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	Nutley Street		SBT	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	7 Nutley Street/ Windover Avenue	ALL WAY STOP	EBLTR	B [10.3]	B [10.5]	-	B [10.5]	B [10.7]	-
			WBLT	B [10.1]	B [12.0]	-	B [10.3]	B [12.4]	-
	Nutley Street		NBLT	B [10.2]	B [13.2]	-	B [10.5]	B [14.1]	-
			SBLT	B [12.0]	B [13.1]	-	B [12.6]	B [13.9]	-
8 James Madison Drive/ Maple Avenue	Maple Avenue	STOP	Overall	B [10.9]	B [12.5]	-	B [11.2]	B [13.2]	-
	Maple Avenue		EBL	A [9.2]	B [11.1]	A [9.7]	A [9.3]	B [11.6]	A [9.9]
			EBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	Maple Avenue		WBL	B [11.7]	A [9.7]	B [12.4]	B [13.7]	B [10.7]	C [16.7]
			WBTR	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]	A [0.0]
	Driveway		NBLT	F [110.1]	F [113.7]	F [254.6]	F [933.0]	F [789.9]	F [7]
			SBLT	F [92.4]	F [91.3]	F [147.5]	B [13.0]	C [15.6]	C [24.4]
	James Madison Drive								

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) Asterisks * represent delays in excess of 999.9 seconds.
(4) Roadway names in bold are considered north/south for purposes of this analysis

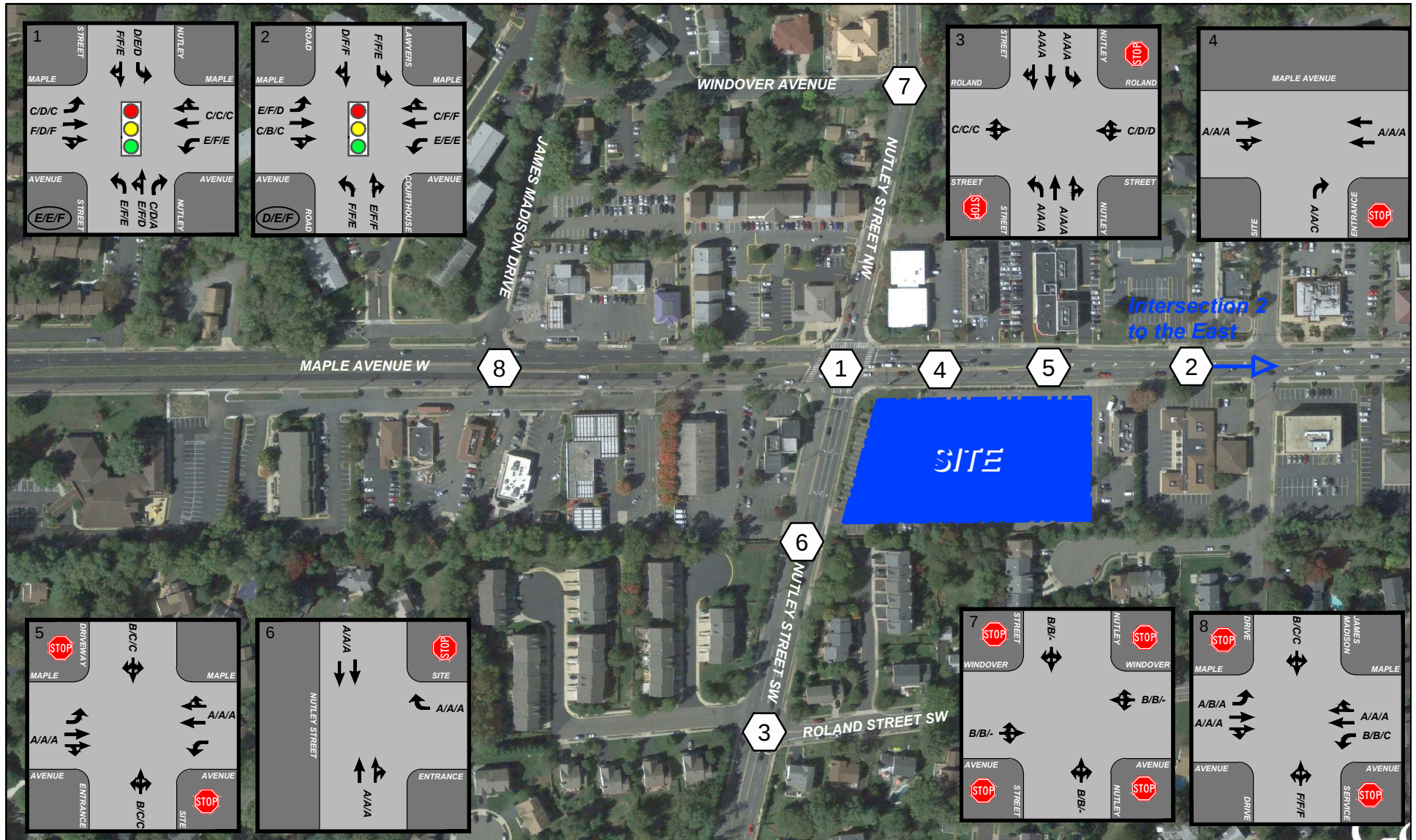


Figure 4-6
2022 Background Future Levels of Service

444 Maple
Town of Vienna

← Represents One Travel Lane
 Signalized Intersection
 Stop Sign



Table 4-3
444 Maple
Background Future Intersection Queuing Summary (1) (2) (3)

Intersection	Approach Roadway	Operating Condition	Approach/ Movement	Available Storage (ft)	Existing		Background 2022			
					AM	PM	SAT	AM	PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	90	34	43	49	42	48	63
			EBTR	n/a	718	447	693	793	502	825
	Maple Avenue		WBL	285	217	306	511	205	362	503
			WBTR	n/a	315	745	495	354	864	607
	Nutley Street		NBL	220	310	458	276	300	517	248
			NBLT	n/a	321	475	284	307	536	252
	Nutley Street		NBR	n/a	227	201	179	102	257	12
			SBL	200	106	153	136	14	175	157
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Signal	EBL	160	119	204	148	126	217	173
			EBTR	n/a	647	365	342	321	320	483
	Maple Avenue		WBL	145	68	100	92	76	86	86
			WBTR	n/a	334	989	1023	308	1134	1181
	Courthouse Road		NBL	230	106	125	111	117	156	141
			NBTR	n/a	376	644	594	414	681	642
	Lawyers Road		SBL	245	318	238	204	350	279	223
			SBTR	n/a	323	539	512	351	643	616
3 Nutley Street/ Roland Street	Rowland Street	STOP	EBLTR	n/a	3	3	2	3	3	3
			WBLTR	n/a	11	15	11	11	15	16
	Nutley Street		NBL	165	1	1	1	0	1	1
			NBTR	n/a	0	0	0	0	0	0
	Nutley Street		SBL	145	0	1	0	0	1	0
			SBTR	n/a	0	0	0	0	0	0
	Maple Avenue		EBTR	n/a	0	0	0	0	0	0
			Maple Avenue Site Entrance	n/a	0	0	0	0	0	0
4 RIRo/ Maple Avenue	Maple Avenue	STOP	NBR	n/a	0	1	1	0	1	2
	Maple Avenue		EBTR	n/a	1	1	0	1	1	0
			WBTR	n/a	1	1	0	1	1	0
	Maple Avenue Site Entrance Driveway		NBLTR	n/a	1	1	2	1	1	2
			SBLTR	n/a	1	3	2	1	4	3
	Site Entrance		WBR	0	0	0	0	0	0	0
			Nutley Street	n/a	0	0	0	0	0	0
5 Site entrance/ Maple Avenue	Nutley Street	STOP	SBT	n/a	0	0	0	0	0	0
	Maple Avenue		EBLTR	n/a	1	1	0	1	1	0
			WBTR	n/a	1	1	0	1	1	0
	Maple Avenue Site Entrance Driveway		NBLTR	n/a	1	1	2	1	1	2
			SBLTR	n/a	1	3	2	1	4	3
	Site Entrance		WBR	0	0	0	0	0	0	0
			Nutley Street	n/a	0	0	0	0	0	0
6 Nutley Street/ Site entrance	Maple Avenue	STOP	EBL	205	14	12	8	14	13	8
			EBTR	n/a	0	0	0	0	0	0
	Maple Avenue		WBL	145	7	4	23	22	13	60
			WBTR	n/a	0	0	0	0	0	0
	Nutley Street		NBLTR	n/a	33	45	81	150	174	*
			SBLTR	n/a	107	133	112	10	23	22
	Site Entrance		WBR	0	0	0	0	0	0	0
			Nutley Street	n/a	0	0	0	0	0	0
7 Nutley Street/ Windover Avenue	Windover Avenue	ALL WAY STOP	EBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a
			WBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Windover Avenue		NBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a
			SBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Nutley Street		EBL	205	14	12	8	14	13	8
			EBTR	n/a	0	0	0	0	0	0
	Maple Avenue		WBL	145	7	4	23	22	13	60
			WBTR	n/a	0	0	0	0	0	0
8 James Madison Drive/ Maple Avenue	Maple Avenue	STOP	NBLTR	n/a	33	45	81	150	174	*
			SBLTR	n/a	107	133	112	10	23	22
	Maple Avenue		EBL	205	14	12	8	14	13	8
			EBTR	n/a	0	0	0	0	0	0
	Maple Avenue		WBL	145	7	4	23	22	13	60
			WBTR	n/a	0	0	0	0	0	0
	Nutley Street		NBLTR	n/a	33	45	81	150	174	*
			SBLTR	n/a	107	133	112	10	23	22

Notes (1) Turning movement queue length is based on the 95th percentile queue in feet as reported by Synchro, Version 9.
(2) Roadway names in bold are considered north/south for purposes of this analysis
(3) Queues for All Way STOPS (Nutley Street/Windover Avenue) not reported by Synchro

Section 5 SITE ANALYSIS

OVERVIEW

The Applicant has filed a rezoning application to permit the development of approximately 160 multifamily dwelling units and 20,000 GSF additional retail uses. As scoped with County and VDOT staff, this TIA provides an analysis of 2022 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 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 9th 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.

- 125 weekday AM peak hour trips
- 133 weekday PM peak hour trips
- 261 Saturday peak hour trips
- 1,449 average weekday daily trips

The net new external vehicle trips detailed above include and 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 apartment/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 use the retail portions of the site.

During the course of analysis it was realized that the trip generation rates/equations in ITE for the residential and commercial uses for a Saturday represent the peak hour of the generator for those specific uses and by their nature experience their traffic peak at different times of the day. This variation in the peak hours of the different land uses is more evident during the weekend. Having a mix of uses that provide synergy with each other as well as distribute peak hour traffic is in line with the MAC district “vision” as well as the intent of the developer. To account for this difference diurnal rates for the shopping center use as provided by ITE *Trip Generation* and for the residential use as provided by the *ITE Journal* were consulted. According to the diurnal rates the inbound trips for a shopping center and outbound trips for a residential use correspond to the analyzed Saturday peak hour so no reduction was taken for those specific movements. A slight reduction was taken for outbound shopping center trips and inbound residential trips based on the variation of the diurnal each of the uses relative to the single Saturday peak hour that was evaluated in the study. The diurnal rate sources are provided as Appendix H and the reductions are shown with the other reductions above on Table 5-1.

Table 5-1 also provides a trip generation analysis assuming the subject site was developed by-right (without the need for a rezoning application). For purposes of this analysis, it was assumed that the site could redevelop as a grocery store use. As shown in Table 5-1, the site could potentially generate substantially more vehicle trips if redeveloped by-right than trips generated by the proposed redevelopment.

PROPOSED SITE ACCESS

Vehicular access to the subject property is proposed to be provided by a full-movement driveway at an existing, unsignalized median break on Maple Avenue and a STOP controlled right-in/right-out (RiRo) driveway on Nutley Street. These access points currently exist and will remain unchanged with the exception of a right-in/right-out entrance on Maple Avenue which will be eliminated with the development of the site. A reduction of the proposed layout is provided on Figure 2-1 and a full-size copy of the CDP/FDP layout is included as Appendix B. The total future lane use and traffic controls assumed under total future conditions that incorporates the proposed site access and those transportation improvements listed under Section 4 of this TIA 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 VDOT and Town staff, a review of existing traffic patterns in the study area, future development patterns, local knowledge, and engineering judgment as recommended by 24 VAC 30-155-60.D. As scoped and agreed to with VDOT and Town staff (see Appendix A), the trip distributions assumed for the proposed residential 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.

PARKING SUPPLY

The Applicant is proposing to provide 336 parking spaces within structured and surface parking to accommodate the proposed uses. A reduction of the proposed parking plan is provided as Figure 5-4. Specifically, the Applicant is proposing to provide 199 spaces for the residential uses and 137 spaces for the retail uses (including assumptions for potential restaurant use within the retail space). Article 16 of the Town Code of Vienna specifies the following off-street parking requirements for the proposed uses:

Multiple Family:	Efficiency: 1 space/dwelling unit
	One Bedroom: 1.5 spaces/dwelling unit
	Two or more Bedrooms: 2 spaces/dwelling unit

Commercial Building: 1 space/200 SF of floor area
Restaurant: 1 space/4 seats

As provided for in the Town's MAC zoning designation as an incentive for meeting certain design features, the Applicant proposes to apply a 15 percent reduction in the minimum number of parking spaces required under Article 16. Furthermore, the proposed parking supply accounts for an incentive to provide structured parking in that each space within a parking structure can be counted as 1.25 spaces towards meeting the minimum parking requirement. These reductions are accounted for the proposed parking supply reflected in Figure 5-4.

Table 5-1
444 Maple
Site Trip Generation ⁽¹⁾

Scenario	Land Use Code	Amount	Units	AM Peak Hour		Total	PM Peak Hour		Average Daily Trips	Saturday Peak Hour		Total	
				In	Out		In	Out		In	Out		
Proposed Program													
Apartment	220	160	Rooms	16	66	82	69	37	106	45	38	83	
				(1)	(2)	(3)	(3)	(2)	(133)	(7)	(6)	(13)	
				Internal allowance (5%/10%/15%)									
				Saturday Off-Peak Reduction (2% In, 0% Out)									
Net External Trips				15	64	79	66	35	101	37	32	70	
Specialty Retail	826	20,000	SF	36	38	74	24	30	54	160	147	307	
				Retail Subtotal									
				36	38	74	24	30	54	160	147	307	
				(2)	(1)	(3)	(2)	(3)	(5)	(6)	(7)	(13)	
Internal allowance (5%/10%/15%)										0	(3)	(3)	
Saturday Off-Peak Reduction (0% In, 2.2% Out)										154	137	294	
Net External Trips				34	37	71	22	27	49	753	(48)	(103)	
Pass-by Trips (35%)				(12)	(13)	(25)	(8)	(9)	(17)	(264)	(54)	(103)	
Net New External Retail Trips				22	24	46	14	18	32	489	100	191	
By-Right													
Net New Trips				37	88	125	80	53	133	1,449	137	121	261
Supermarket	850	62,780	SF	132	81	213	282	270	552	353	339	692	
				(46)	(28)	(75)	(99)	(95)	(193)	(124)	(119)	(242)	
				Pass-by Trips (35%)									
				Net New Trips									
Net New Trips				86	53	138	183	175	359	229	220	450	
Difference (Proposed minus By-Right)													
				(49)	35	(13)	(103)	(122)	(226)	(92)	(99)	(189)	

Note(s):

- (1) Trip generation based on the Institute of Transportation Engineers' Trip Generation Manual, 9th Edition.
(2) For LU code 220 no Directional Distribution for Saturday is provided by ITE. For purposes of this analysis, the distribution used is for LU Code 230 (Residential Condominium/Townhouse)
(3) For LU code 826 no Saturday Peak Hour is provided by ITE. For purposes of this analysis, the Saturday Peak Hour of Generator for LU Code 820 (Shopping Center) was used

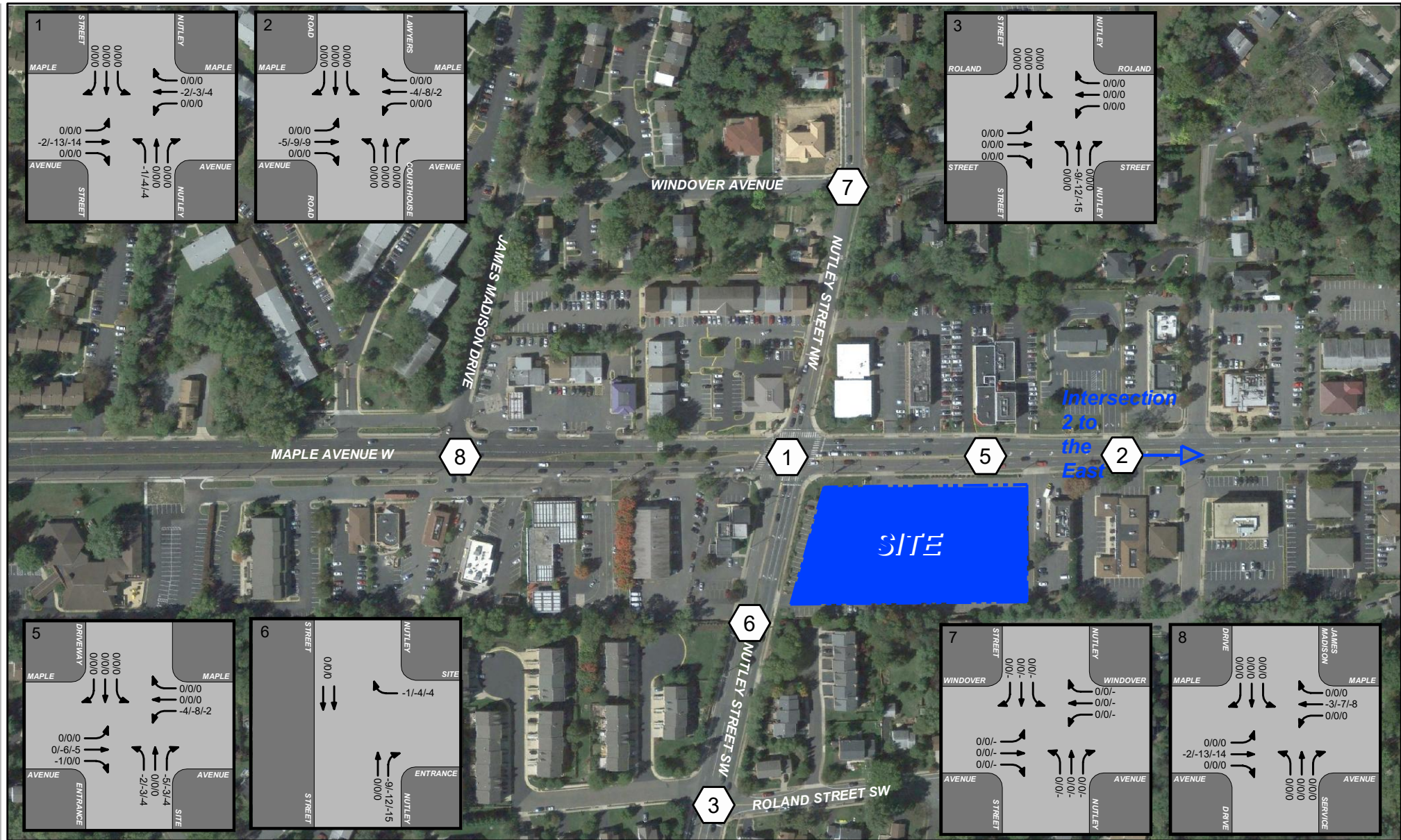


Figure 5-1
Existing Site Trips To Be Removed

444 Maple
Town of Vienna, Virginia

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



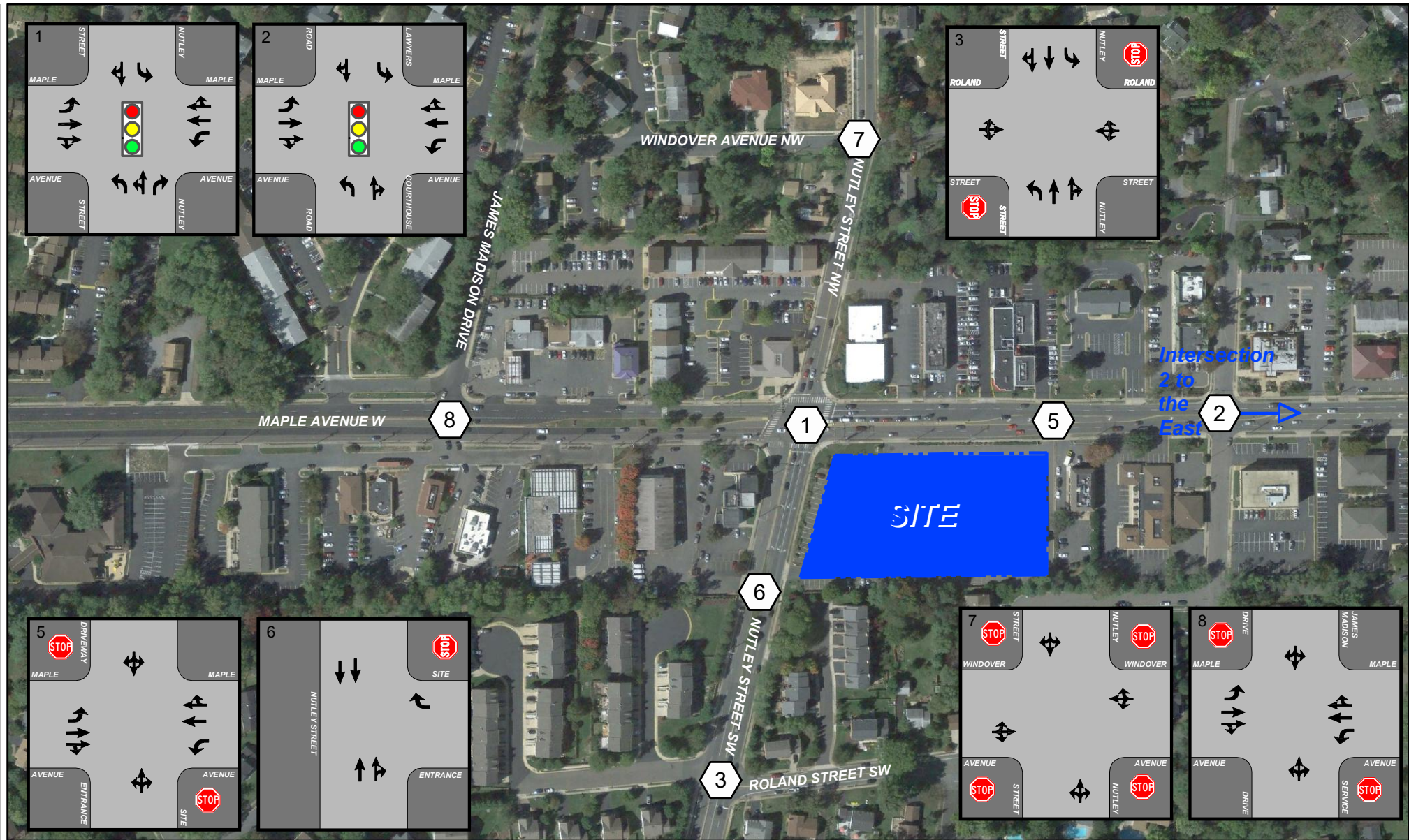


Figure 5-2
Future Lane Use and Traffic Controls

444 Maple
Town of Vienna

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign



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Figure 5-3
Site Trip Assignments and Percent Distribution

444 Maple
Town of Vienna, Virginia

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



	Unit	Area	Balcony	B2	B1	G	F1	F2	F3	Total		Ratio
S	S1	527 SF	0 SF	0	0	0	3	0	0	3	6	3.8%
	S2	647 SF	0 SF	0	0	0	1	1	1	3		
1 BR	A1	702 SF	0 SF	0	0	0	11	11	11	33	90	56.3%
	A2	702 SF	66 SF	0	0	0	8	11	11	30		
	A3	774 SF	0 SF	0	0	0	1	1	1	3		
	A4	759 SF	0 SF	0	0	0	2	2	2	6		
DEN	B1	863 SF	0 SF	0	0	0	3	3	3	9	64	40.0%
	B2	900 SF	0 SF	0	0	0	1	1	1	3		
	B3	897 SF	0 SF	0	0	0	1	1	1	3		
	B4	918 SF	0 SF	0	0	0	1	1	1	3		
2 BEDROOM	C1	1,053 SF	0 SF	0	0	0	7	7	7	21	64	40.0%
	C2	1,053 SF	66 SF	0	0	0	2	2	2	6		
	C3	1,185 SF	0 SF	0	0	0	3	3	3	9		
	C4	1,124 SF	176 SF	0	0	0	5	5	6	16		
	C5	1,159 SF	0 SF	0	0	0	1	1	1	3		
	C6	1,227 SF	166 SF	0	0	0	1	1	1	3		
	C7	1,055 SF	66 SF	0	0	0	1	1	1	3		
	C8	1,109 SF	66 SF	0	0	0	1	1	1	3		
Total Units				0	0	0	53	53	54	160		
AREA										Total	Average Area per Unit	
	Net Residential Area			0 SF	0 SF	0 SF	46,364 SF	46,889 SF	48,013 SF	141,266 SF	Avg/Unit	882.9 SF
	Amenity Area			0 SF	0 SF	6,231 SF	2,532 SF	0 SF	0 SF	8,763 SF	Efficiency	82.4%
	Gross Residential Area Excluding B			0 SF	0 SF	6,231 SF	55,641 SF	54,157 SF	55,380 SF	171,409 SF	Avg/Unit	1,071.3 SF
	Gross Residential Area Including B			0 SF	0 SF	6,231 SF	57,479 SF	56,193 SF	57,592 SF	177,495 SF	Avg/Unit	1,109.3 SF
	Gross Retail Area (Non Restaurant)			0 SF	0 SF	10,103 SF	0 SF	0 SF	0 SF	10,103 SF		
	Gross Restaurant Area			0 SF	0 SF	10,213 SF	0 SF	0 SF	0 SF	10,213 SF		
Outdoor Retail Seating			0 SF	0 SF	2,032 SF	0 SF	0 SF	0 SF	2,032 SF			
PARKING	Required									Required		Reduced
	Residential Parking Required			1 / Studio, 1.5 / 1 BR, 2 / 2BR+, Optional 15% Reduction						269	-15%	229
	Retail Parking Required			5 Spaces / 1000 SF, Optional 15% Reduction						51	-15%	44
	Restaurant Parking Required			1 Space / 4 Seats (1 Seat = Area x 60% / 15 sf)						103	-15%	88
	Outdoor Seating Parking Required			1 Space / 4 Seats (1 Seat = Area / 15 sf)						34	-15%	29
	Total Retail Parking Required									188		161
	Total Parking Required									457		390
	Provided			Bonus: Structured Parking Garage Counts as 1.25 Spaces						Provided		Bonus
	Parking Type			Garage	Garage	Surface						25%
	Residential Parking Provided			199	0	0	0	0	0	199		249
	Retail Parking Provided			0	85	52	0	0	0	137		159
Total Parking Provided			199	85	52	0	0	0	336		408	
BIKE PARKING	Res Bike Parking Required			1 / 10 DU + 1 / 50 DU						20		
	Retail Bike Parking Required			1 / 5,000 SF + 1 / 25,000 SF						3		
	Total Bike Parking Required									23		
	Res Bike Parking Provided			0	0	60	0	0	0	60		
	Retail Bike Parking Provided			0	0	20	0	0	0	20		
Total Bike Parking Provided			0	0	80	0	0	0	80			

Figure 5-4
Parking Supply

Section 6

2022 BUILD OUT ANALYSIS OF TOTAL FUTURE CONDITIONS WITH PROPOSED DEVELOPMENT

TOTAL FUTURE TRAFFIC FORECASTS

The 2022 and 2028 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, and the total site trip assignments shown on Figure 5-3. The resulting total future traffic forecasts for year 2022 and 2028 are provided on Figure 6-1 and Figure 6-1a respectively.

OPERATIONAL ANALYSIS

The total future (with proposed development) capacity analyses for year 2022 and 2028 were performed at the study intersections based on the total future traffic forecasts shown on Figure 6-1 and Figure 6-1a and the future lane use and traffic controls shown on Figure 5-2. The results of the total future conditions analyses are presented in Appendix I and summarized in Table 6-1. The results are also summarized graphically on Figure 6-2 and Figure 6-2a.

Results. The results of the total future (with the proposed development) intersection capacity analyses indicate the signalized Nutley Street/Maple Avenue intersection continues to operate during the weekday AM, PM and Saturday peak hours consistent with background future conditions. All the STOP controlled intersections and driveways that serve the site have traffic movements that operate at LOS “D” or better in the AM, PM and Saturday peak hours, with the exception northbound left movements exiting the site along Maple Avenue.

QUEUING ANALYSIS

A queuing analysis was conducted for 2022 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 I. As shown on Table 6-2, a number of 95th percentile queues extend past the available effective storage in the total future condition consistent with background future conditions.



444 Maple
Town of Vienna, Virginia



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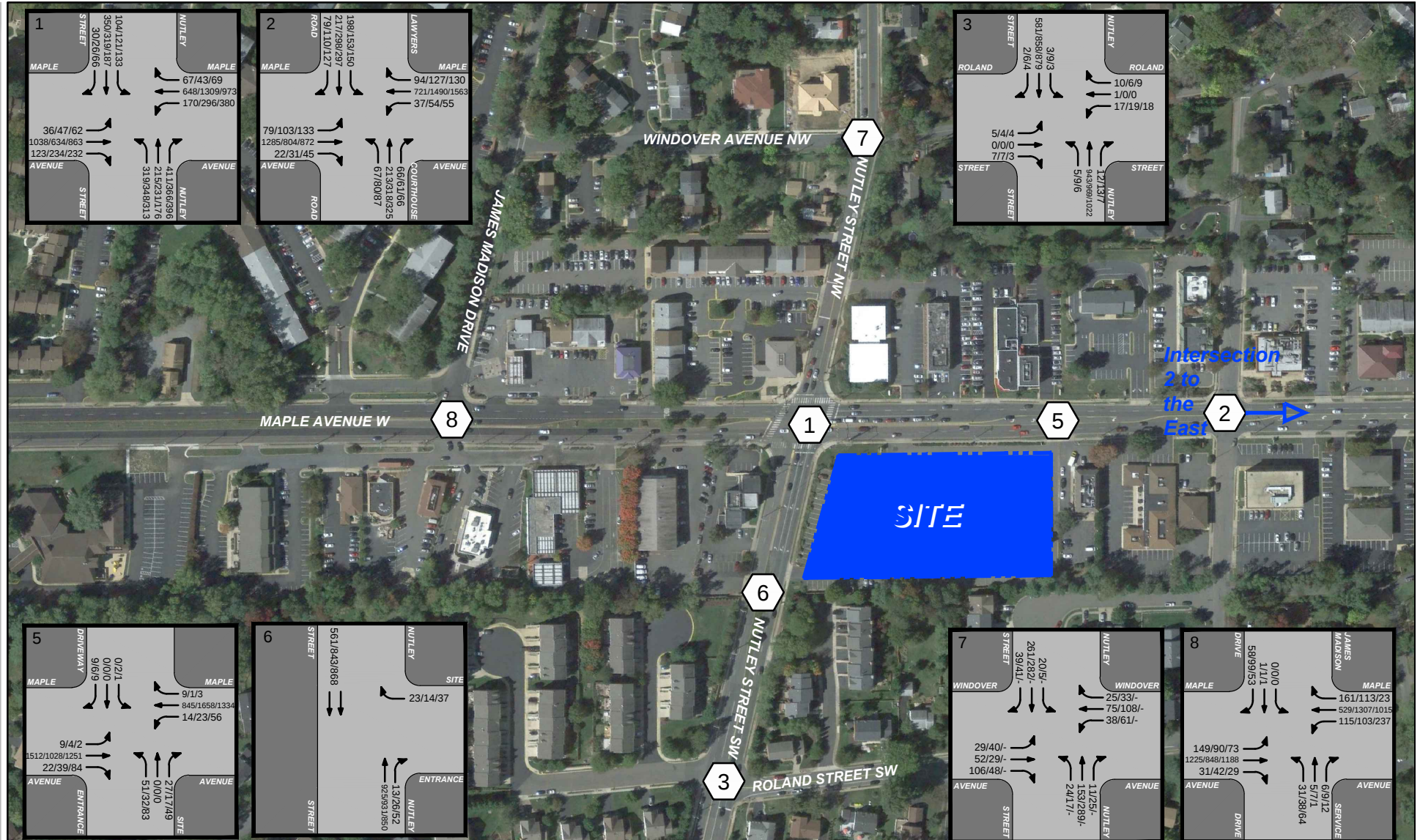


Figure 6-1a
2028 Total Future Traffic Forecasts

444 Maple
Town of Vienna, Virginia

JCP



Table 6-1

444 Maple

Total Future Intersection Levels of Service Summary (1) (2) (3) (4)

Intersection	Approach/ Roadway	Operating Condition	Approach/ Movement	Existing			Background 2022			Total Future 2022			Total Future 2028		
				AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	C (28.6)	D (40.8)	D (35.8)	C (28.5)	D (42.5)	D (38.6)	C (29.8)	D (42.9)	D (39.8)	C (30.9)	D (44.1)	D (42.0)
			EBTR	F (81.0)	D (50.8)	F (39.5)	F (86.1)	D (53.1)	F (208.1)	F (105.3)	D (54.7)	F (243.4)	F (143.7)	E (55.2)	F (276.2)
	Maple Avenue		WBL	D (50.4)	D (52.1)	D (52.1)	F (68.7)	F (80.7)	F (80.7)	F (80.7)	F (80.7)	F (81.5)	F (81.5)	F (134.2)	F (110.7)
			WBTR	C (32.6)	C (32.6)	C (34.6)	C (32.7)	C (32.3)	C (21.6)	C (28.7)	C (33.9)	C (32.9)	C (30.1)	C (42.2)	C (29.1)
	Nutley Street		NBL	E (68.1)	F (95.8)	E (66.4)	E (66.4)	F (120.8)	E (55.1)	E (66.8)	F (118.3)	E (57.4)	E (69.3)	F (132.2)	E (59.9)
			NBLT	E (67.8)	F (95.5)	E (65.9)	E (65.3)	F (120.4)	D (54.8)	E (66.0)	F (118.3)	E (55.5)	E (68.2)	F (127.8)	E (58.3)
	Nutley Street		NBR	D (44.8)	D (39.6)	D (27.2)	C (22.6)	C (22.6)	A (5.8)	C (22.5)	D (51.1)	A (7.4)	C (25.5)	D (54.3)	A (10.0)
			SBL	D (49.7)	E (58.4)	D (52.6)	D (50.6)	E (59.7)	D (53.6)	D (50.9)	E (60.8)	D (54.7)	D (51.1)	E (62.8)	D (54.3)
	Overall		SBLTR	E (154.6)	E (120.6)	E (73.4)	E (157.5)	E (145.5)	E (76.0)	E (157.5)	E (152.0)	E (76.0)	E (183.9)	E (205.6)	E (79.9)
			Overall	E (71.2)	E (63.5)	E (72.6)	E (69.1)	E (66.6)	F (86.8)	E (76.1)	F (92.0)	F (99.5)	F (93.0)	E (80.0)	F (113.7)
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Singl	EBL	E (69.2)	F (106.4)	E (68.6)	E (77.9)	F (120.9)	D (54.5)	E (79.1)	F (125.2)	E (56.3)	E (79.0)	F (132.8)	E (59.9)
			EBTR	D (38.6)	C (27.9)	E (68.6)	C (22.2)	B (16.7)	C (29.8)	C (23.3)	B (17.3)	C (29.4)	C (28.6)	B (17.8)	C (30.5)
	Maple Avenue		WBL	E (67.5)	F (80.3)	E (68.6)	E (67.1)	E (74.2)	E (73.2)	E (67.0)	E (74.3)	E (73.2)	E (76.9)	E (76.9)	E (73.9)
			WBTR	C (29.9)	E (59.7)	F (100.8)	C (27.2)	F (85.2)	F (151.7)	C (27.4)	F (86.9)	F (162.1)	C (28.3)	F (113.4)	F (199.3)
	Courthouse Road		NBL	E (77.1)	F (80.7)	E (73.7)	F (85.2)	F (87.5)	F (74.0)	F (85.2)	F (87.5)	F (74.0)	F (89.4)	F (88.9)	F (75.6)
			NBLT	E (73.5)	F (123.3)	F (103.5)	E (78.2)	F (139.2)	F (140.5)	E (78.8)	F (144.2)	F (148.9)	F (86.3)	F (174.9)	F (85.3)
	Lawyers Road		SBL	F (104.1)	F (89.4)	E (75.4)	F (105.2)	F (96.5)	E (76.7)	F (105.2)	F (96.5)	E (76.7)	F (130.4)	F (100.1)	F (78.9)
			SBLT	D (49.4)	E (68.8)	E (67.5)	D (49.0)	F (86.3)	E (89.8)	D (49.1)	F (88.0)	E (95.0)	D (50.8)	E (113.5)	E (113.5)
	Overall		Overall	D (46.4)	E (43.6)	E (76.5)	D (39.9)	F (76.5)	F (105.5)	D (40.5)	E (78.3)	F (111.4)	D (45.5)	F (95.7)	F (134.1)
			Overall	C (159)	C (177.6)	C (18.8)	C (15.1)	C (17.7)	C (23.4)	C (15.6)	C (18.1)	D (25.3)	C (16.8)	C (20.1)	D (28.8)
3 Nutley Street/ Roland Street	Rowland Street	STOP	EBLTR	C (23.0)	D (30.7)	C (23.0)	C (22.4)	D (30.8)	D (31.6)	C (22.0)	D (32.1)	D (34.8)	D (26.2)	E (38.7)	E (42.1)
			NBLTR	A (9.1)	A (9.8)	A (9.5)	A (9.1)	A (9.7)	A (9.7)	A (9.2)	A (9.8)	A (9.9)	A (9.3)	B (10.1)	B (10.1)
	Nutley Street		NBLT	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
			SBL	A (9.5)	A (9.2)	A (9.4)	A (9.4)	A (9.3)	A (9.6)	A (9.4)	A (9.3)	A (9.7)	A (9.7)	B (10.0)	B (10.0)
	Nutley Street		SBLT	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
			Overall	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Maple Avenue	STOP	EBTR	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
			WBTR	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Site Entrance		NBL	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
			Overall	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
4 RRo/ Maple Avenue	Maple Avenue	STOP	EBTR	A (10.3)	A (10.3)	A (10.1)	A (10.4)	A (10.3)	A (10.1)	A (10.4)	A (10.3)	A (10.1)	A (10.4)	A (10.4)	A (10.1)
			WBTR	A (10.2)	A (10.3)	A (10.1)	A (10.4)	A (10.3)	A (10.1)	A (10.4)	A (10.3)	A (10.1)	A (10.4)	A (10.4)	A (10.1)
	Site Entrance		NBLTR	B (13.3)	B (14.6)	C (15.1)	B (14.4)	C (15.2)	C (16.4)	D (27.9)	C (20.2)	E (35.6)	E (35.2)	C (21.7)	E (44.5)
			SBLTR	B (11.2)	C (21.8)	C (15.2)	B (11.5)	C (24.1)	C (16.2)	B (11.5)	C (24.7)	C (16.7)	B (11.7)	D (27.3)	C (17.8)
	Site Entrance	STOP	WBL	B (11.5)	A (9.1)	A (9.0)	A (9.8)	A (9.1)	A (9.5)	B (10.0)	A (9.2)	A (9.8)	B (10.3)	A (9.2)	B (10.0)
			NBLTR	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Nutley Street		SBL	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
			Overall	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Site Entrance	STOP	WBLTR	B (10.3)	B (10.5)	-	B (10.5)	B (10.7)	-	B (10.6)	B (10.9)	-	B (10.8)	B (11.1)	-
			NBLTR	B (10.2)	B (13.2)	-	B (10.5)	B (14.1)	-	B (10.7)	B (14.6)	-	B (11.0)	C (15.7)	-
5 Site entrance/ Maple Avenue	Nutley Street	ALL WAY	SBLTR	B (12.0)	B (13.1)	-	B (12.0)	B (13.2)	-	B (12.8)	B (14.4)	-	B (13.4)	C (15.5)	-
			Overall	B (10.9)	B (12.5)	-	B (11.2)	B (13.2)	-	B (11.4)	B (13.7)	-	B (11.8)	B (14.5)	-
	Windover Avenue	STOP	EBL	A (9.2)	B (11.1)	A (9.7)	A (9.3)	B (11.6)	A (9.9)	A (9.3)	B (11.6)	A (9.9)	A (9.4)	B (12.1)	B (10.1)
			EBTR	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Maple Avenue		WBL	B (11.7)	A (9.7)	B (13.7)	B (13.7)	B (10.7)	C (16.7)	B (13.8)	B (10.7)	C (17.2)	B (14.6)	B (11.0)	C (18.6)
			WBTR	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)	A (10.0)
	Nutley Street		NBLTR	F (110.1)	F (113.7)	F (254.6)	F (933.0)	F (789.9)	F (1)	F (987.0)	F (843.1)	F (1)	F (286.3)	F (1249.4)	F (100)
			SBLTR	F (92.4)	F (91.3)	F (147.5)	B (13.0)	C (15.6)	C (24.4)	B (13.1)	C (15.9)	D (26.3)	B (14.0)	C (18.9)	E (36.9)
	James Madison Drive		Overall	F (92.4)	F (91.3)	F (147.5)	B (13.0)	C (15.6)	C (24.4)	B (13.1)	C (15.9)	D (26.3)	B (14.0)	C (18.9)	E (36.9)
			Overall	F (92.4)	F (91.3)	F (147.5)	B (13.0)	C (15.6)	C (24.4)	B (13.1)	C (15.9)	D (26.3)	B (14.0)	C (18.9)	E (36.9)

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) Asterisks * represent delays in excess of 999.9 seconds.

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

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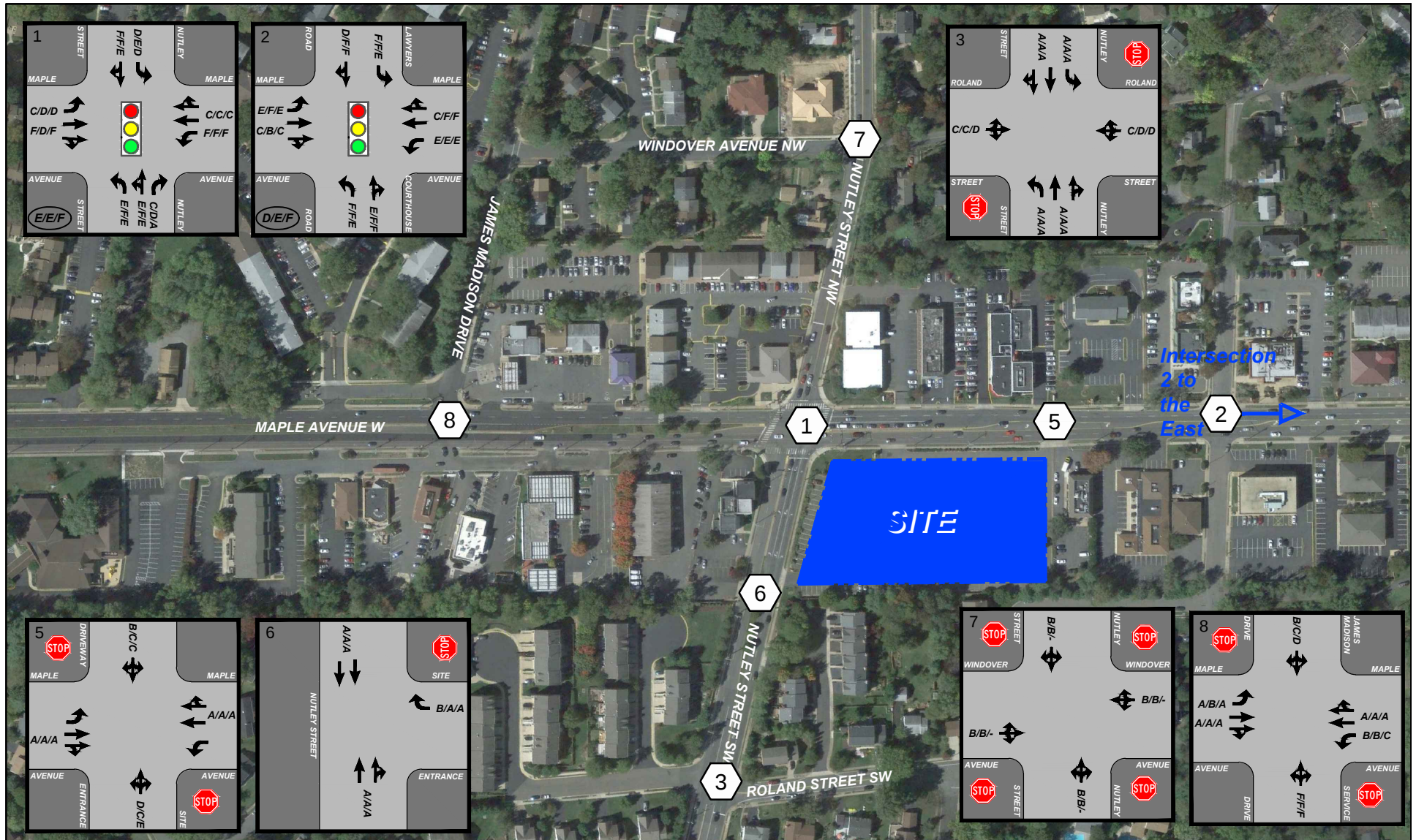


Figure 6-2
2022 Total Future Levels of Service

444 Maple
Town of Vienna

- ← Represents One Travel Lane
- Signalized Intersection
- Stop Sign



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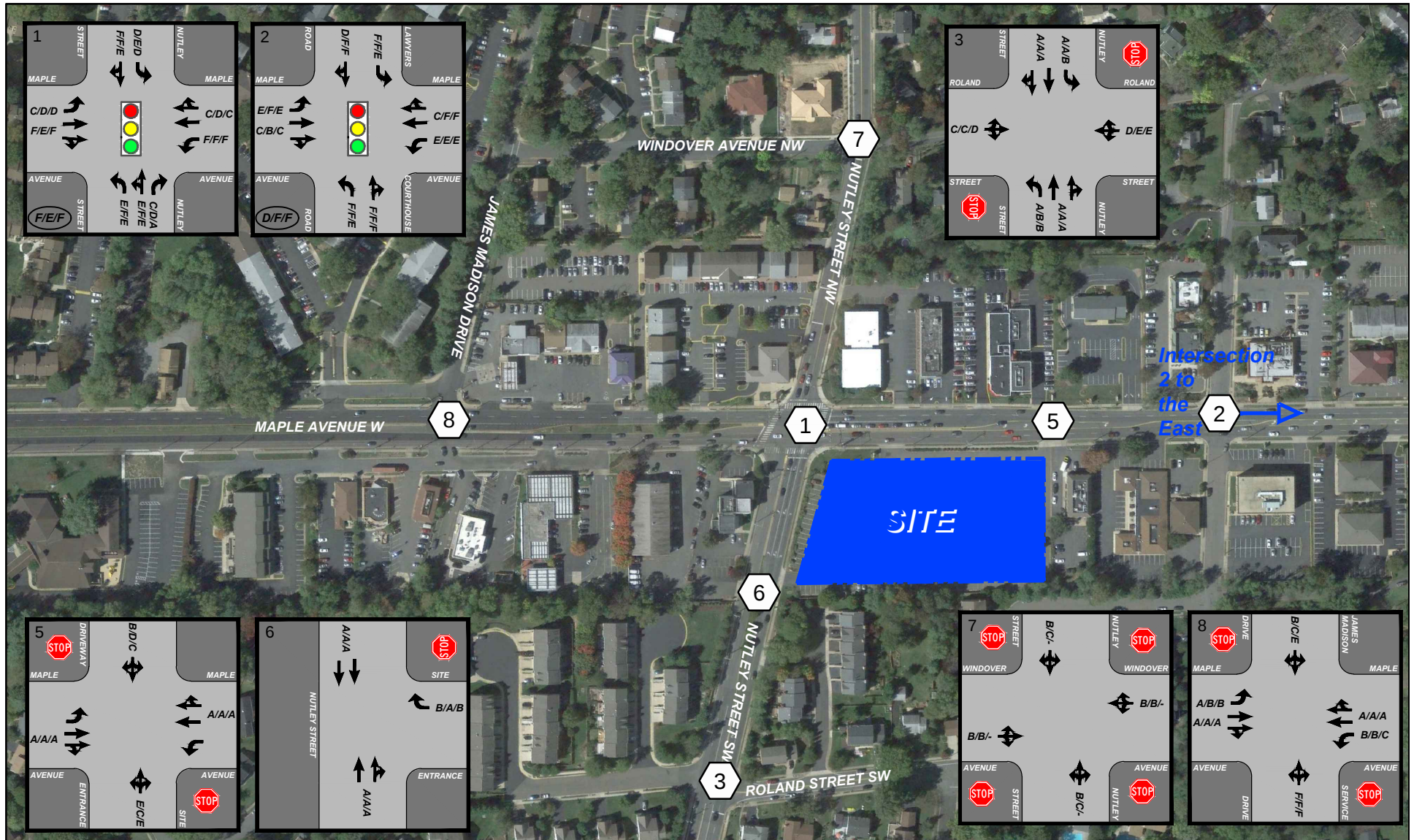


Figure 6-2A
2028 Total Future Levels of Service

444 Maple
Town of Vienna

← Represents One Travel Lane
 Signalized Intersection
 Stop Sign



Table 6-2

444 Maple

Total Future Intersection Queuing Summary (1) (2) (3)

Intersection	Approach Roadway	Operating Condition	Approach/ Movement	Available Storage (ft)	Existing			Background 2022			Total Future 2022			Total Future 2028		
					AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
1 Nutley Street/Maple Avenue	Maple Avenue	Signal	EBL	90	34	43	49	42	48	63	42	48	63	43	50	65
			EBTR	n/a	718	447	693	793	502	825	804	512	854	876	552	918
	Maple Avenue		WBL	285	217	306	511	205	362	503	262	417	578	280	482	626
			WBTR	n/a	315	745	495	354	864	607	360	877	631	383	971	694
	Nutley Street		NBL	220	310	458	276	300	517	248	338	533	277	396	573	303
Nutley Street			NBL-T	n/a	321	475	284	307	536	252	341	538	274	409	583	303
			NBR	n/a	227	201	179	102	257	12	108	259	22	134	275	43
			SBL	200	106	153	136	14	175	157	14	192	184	154	203	192
			SBTR	n/a	573	601	293	628	653	341	628	653	341	676	703	377
2 Courthouse Road, Lawyers Road/ Maple Avenue	Maple Avenue	Signal	EBL	160	119	204	148	126	217	173	133	228	190	139	243	218
			EBTR	n/a	647	365	342	321	320	483	326	325	483	351	325	508
	Maple Avenue		WBL	145	68	100	92	76	86	86	75	86	86	80	92	91
			WBTR	n/a	334	989	1023	308	1134	1181	309	1140	1198	331	1250	1301
	Courthouse Road		NBL	230	106	125	111	117	156	141	117	156	141	126	167	154
Lawyers Road			NBL	n/a	376	644	594	414	681	642	416	693	658	454	747	710
			NBTR	n/a	318	238	204	350	279	223	350	279	223	374	301	246
			SBL	245	318	539	512	351	643	616	355	653	631	379	710	684
			SBTR	n/a	323											
3 Nutley Street/ Rowland Street	Rowland Street	STOP	EBLTR	n/a	3	3	2	3	3	3	3	3	3	3	4	3
	Rowland Street		WBLTR	n/a	11	15	11	11	15	16	11	15	18	13	19	22
	Nutley Street		NBL	165	1	1	1	0	1	1	0	1	1	0	1	1
			NBTR	n/a	0	0	0	0	0	0	0	0	0	0	0	0
	Nutley Street		SBL	145	0	1	0	0	1	0	0	1	0	0	1	0
4 R/Ra/ Maple Avenue			SBTR	n/a	0	0	0	0	0	0	0	0	0	0	0	0
	Maple Avenue	STOP	EBTR	n/a	0	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a
	Maple Avenue		WBL	n/a	0	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a
	Site Entrance		NBR	n/a	0	1	1	0	1	2	n/a	n/a	n/a	n/a	n/a	n/a
5 Site entrance/ Maple Avenue	Maple Avenue	STOP	EBTR	n/a	1	1	0	1	1	0	1	1	0	1	1	0
	Maple Avenue		WBTR	n/a	1	1	0	1	1	0	2	3	9	3	3	10
	Site Entrance		NBLTR	n/a	1	1	2	1	1	2	38	16	78	48	18	94
	Driveway		SBLTR	n/a	1	3	2	1	4	3	1	4	3	1	4	3
6 Nutley Street/ Site entrance	Site Entrance	STOP	WBL	n/a	0	0	0	0	0	0	3	1	4	3	1	4
	Nutley Street		NBTR	n/a	0	0	0	0	0	0	0	0	0	0	0	0
	Nutley Street		SBT	n/a	0	0	0	0	0	0	0	0	0	0	0	0
7 Nutley Street/ Windover Avenue	Windover Avenue	ALL WAY	EBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Windover Avenue	STOP	WBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Nutley Street		NBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Nutley Street		SBLTR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8 James Madison Drive/ Maple Avenue	Maple Avenue	STOP	EBL	205	14	12	8	14	13	8	15	13	8	15	14	8
			EBTR	n/a	0	0	0	0	0	0	0	0	0	0	0	0
	Maple Avenue		WBL	145	7	4	23	22	13	60	23	13	62	25	14	69
			WBTR	n/a	0	0	0	0	0	0	0	0	0	0	0	0
	Driveway		NBLTR	n/a	33	45	81	150	174	*	152	177	*	160	193	err
James Madison Drive			SBTR	n/a	107	133	112	10	23	22	11	24	25	12	31	36

Notes: (1) Turning movement queue length is based on the 95th percentile queue in feet as reported by Synchro, Version 9.

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

(3) Queues for All Way STOPS (Nutley Street/Windover Avenue) not reported by Synchro

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 residents, tenants, and employees 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 residents and 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 (MWCOC) Commuter Connections program, the Washington Metropolitan Area Transit Authority (WMATA), the Fairfax County government, and others.
 - 4. Provide on-site assistance to residents and 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).
 - 8. Installation of transportation information displays in building lobby areas, displays stocked with transit, vanpool, carpool, guaranteed ride home, etc. brochures and flyers, and installation of digital display screens for transit information showing real-time bus route and Metrorail information and alerts.
- 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 lease/sales, provide SmarTrip cards to residents.
 - 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 parking spaces on site for a car sharing service (i.e., Zip or Flex Car).
 - 2. Institute paid parking and/or unbundle the multi-family parking spaces.

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 2.76 acres with approximately 160 multifamily dwelling units and 20,000 GSF of additional retail uses.
2. Under existing 2016 conditions, the signalized Nutley Street/Maple Avenue intersection currently operates at an overall level of service (LOS) "E" or better during the weekday AM, PM and Saturday peak hours. All the STOP controlled intersections and driveways that serve the site have traffic movements that operate at LOS "C" 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 redevelopment of the Marco Polo site).
4. Under 2022 background conditions (build out of the future conditions without the proposed mixed-use development), the signalized Nutley Street/Maple Avenue study intersection would show improved at overall LOS "E" or better during the weekday AM, PM and LOS "F" during the Saturday peak hour. All the STOP controlled intersections and driveways that serve the site have traffic movements that continue to operate at LOS "C" or better in the AM, PM and Saturday peak hours consistent with existing conditions.
5. According to ITE, the proposed mixed-use development is anticipated to generate approximately 125 weekday AM peak hour net new external trips, 133 weekday PM peak hour net new external trips, 261 Saturday peak hour net new external trips, and 1,449 daily (24-hour) net new external trips. These site trips include an internal allowance reduction between the residential and retail components, a minor reduction to account for the commercial and residential uses peaking at different times on Saturday, as well as a pass-by reduction for the retail portion.
6. Under 2022 total future conditions (build out of the future conditions with the proposed mixed-use development), the signalized Nutley Street/Maple Avenue study intersection would show levels of service at overall LOS "E" or better during the weekday AM, weekday PM, and LOS "F" during the Saturday peak hours consistent with background future levels of service. All the STOP controlled intersections and driveways that serve the site have traffic movements that continue to operate at LOS "E" or better in the AM, PM and Saturday peak hours generally consistent with background conditions with the exception of the northbound left exit movement out of the site on to Maple Avenue.
7. Under 2028 total future conditions all through movements along Nutley Street and Maple Avenue would experience increased delay due to increased regional traffic growth.
8. The existing, background and future analysis scenarios indicate that the weekday AM, PM

and Saturday peak hour vehicle queues would not be accommodated within existing turn lane bays.

RECOMMENDATIONS

In order to mitigate the traffic generated by the proposed mixed-use development, the following are recommended:

1. The site should be developed with the proposed access as currently illustrated on the Conceptual Development Plan (CDP) layout that removes the existing right-in/right-out site driveway on Maple Avenue to the subject property to reduce the number of existing curb cuts along Maple Avenue and improve access management.
2. The applicant should promote the pedestrian oriented and mixed-use characteristic of the development by establishing a quality streetscape with pedestrian amenities. Guidance will be provided by the recently approved pedestrian master plan and Maple Avenue Corridor (MAC) Zone guidelines. These include; wide sidewalks meeting or exceeding 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).
3. 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 Metrorail.
4. The applicant should coordinate the design of the site with Town staff so as to not preclude any Maple Avenue/Nutley Street signal improvements and/or possible future intersection modifications that may be completed by others.
5. The Town of Vienna promotes and encourages bicycling as an environmentally and healthy way to get around town and was recently designated as a Bicycle Friendly Community by the League of American Bicyclists. The applicant should incorporate and promote bicycling into the site design. These efforts should include providing both short term and long-term bicycle parking for the residents, employees, shoppers, and visitors to the site as well as improved non-motorized connectivity between the site and adjacent neighborhoods. Additionally, should Capital Bikeshare be expanded to the Town of Vienna, an area should be reserved for a future bikeshare station. In addition to widened sidewalks along the site's frontage, the applicant should consider a neighborhood bicycle/pedestrian connection to Millwood Court SW. This will provide access to Courthouse Road via Glen Avenue SW, a town identified bike route.