Juniper Lane Connectivity Study

Fairfax County, Virginia

June 2019

Juniper Lane Connectivity Study

Fairfax County, Virginia

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EXECUTIVE SUMMARY

Fairfax County is undertaking measures to proactively plan for anticipated growth and development. In the Seven Corners area, redevelopment of the area adjacent to Leesburg Pike on the southwest side of the street in the vicinity of Juniper Lane is expected. This effort attempts to identify a transportation network to be constructed to serve the development anticipated as part of the Comprehensive Plan that also limits cut-through traffic and reduces possible traffic impact generated by future development.

As identified in the Fairfax County Comprehensive Plan, 2017 Edition, the existing study area is defined as the Leesburg Pike Village and is envisioned to redevelop into a 539,000 square-foot mixed-use development. It is meant to serve as a gateway and transition area between the Seven Corners community business center (CBC) to the surrounding neighborhoods. The Comprehensive Plan calls for the full development to consist of the following land uses:

- Residential Uses
    - 129,000 square feet of single-family attached housing
    - 275,000 square feet of multifamily housing
- Non-residential Uses
    - 50,000 square feet of neighborhood-serving office use
    - 40,000 square feet of neighborhood-serving retail use
    - 45,000 square feet of entertainment uses

Fairfax County worked with community members to assess potential transportation network configurations in the study area. Eight scenarios were evaluated based on their potential impacts to the transportation system surrounding the study area and nearby neighborhoods, including, but not limited to, intersection delay, queuing, bicycle and pedestrian connectivity, and additional cut-through traffic.

Following the analysis of the eight redevelopment options, three options were selected through collaborative discussions and meetings between Fairfax County staff and community members. For several months, the County facilitated conversations with the community to evaluate and prioritize the options. A screening-level evaluation is provided for each of the eight options. The more detailed evaluation considers how the three options provide connectivity, mitigate potential traffic impacts, and minimize cut-through traffic. The conclusions and recommendations regarding the more detailed analysis are discussed in the following sections.

CONCLUSIONS

The final three options each have advantages and disadvantages. Each option was assessed based on criteria established after conversations with the County and the community. The evaluation metrics include limiting cut-through traffic, reducing traffic impacts associated with redevelopment, improving neighborhood connectivity, enhancing traffic operations in the study area, and providing bicycle and pedestrian connectivity. While certainly not all-encompassing or fully-informed as to the particulars of any future proposed development, the analysis conducted should serve as a basis for future discussions and as a means of further developing community goals and interests.

Option 3

Option 3 provides a relatively complete road network within the redevelopment area and direct road access to the adjacent neighborhood from Leesburg Pike. Option 3 is likely to provide the most efficient site circulation and result in the lowest traffic impacts associated with redevelopment of the site. **Figure 1** depicts a conceptual rendering of the Leesburg Pike Village development under Option 3. Under this option, the connections to both Juniper Lane and Leesburg Pike allow site trips to efficiently distribute throughout the roadway network without the need for substantial out-of-direction travel. This improved circulation, in turn, improves the anticipated operations at the study intersections relative to the other options.

Figure 1. Option 3 Conceptual Rendering

Option 7

Option 7 provides a moderately complete road network within the redevelopment area and limited direct road access to the adjacent neighborhood from Leesburg Pike. Redevelopment plans shown in **Figure 2** for Option 7 are consistent with plans provided by the current Comprehensive Plan. Site access to Parcels 1 and 2 are provided from two access points on Leesburg Pike. Parcel 3 can be accessed from

Juniper Lane or Patrick Henry Drive. Compared to Options 3 and 8, the study intersections in Option 7 experience moderately higher delays and queues during the weekday a.m. and weekday p.m. peak hours. In addition, Option 7 does not prevent cut-through traffic from accessing Juniper Lane and the surrounding neighborhood streets. **Figure 2** depicts a conceptual rendering of the Leesburg Pike Village development under Option 7. Maintaining the connection between Juniper Lane and the Leesburg Pike Service Road provides neighborhood connectivity but does not allow for complete site circulation as in Option 3.

Figure 2. Option 7 Conceptual Rendering

Option 8

Option 8 provides a minimal road network within the redevelopment area and no direct road access to the adjacent neighborhood from Leesburg Pike. Redevelopment plans for Option 8 provide minimal connectivity at the both the neighborhood and study area levels. Option 8 limits cut-through traffic and provides an opportunity for low-stress bicycle and pedestrian facilities by reducing roadway connectivity. Forecast delays and queuing for Option 8 at Leesburg Pike/Seven Corners Center/Site Access Road B are forecast to be 25-50% shorter than Option 7. **Figure 3** depicts a conceptual rendering of the Leesburg Pike Village development under Option 8.

Figure 3. Option 8 Conceptual Rendering

RECOMMENDATIONS

Based on the detailed analysis of the options, several recommendations were developed for consideration when evaluating development proposals for the Leesburg Pike Village and the associated roadway configuration options. The intent of this report is not to identify a single preferred option, as what is considered 'preferred' is dependent on one's perspective and goals. Rather, this report is meant to provide the information and analysis to help inform the community, the County, and potential land developers on how to balance potentially conflicting interests.

Access Considerations

While all proposed access points to the Leesburg Pike Village should be evaluated based on VDOT and County access management standards, the location and configuration of any access proposed on Patrick Henry Drive, in particular, should be evaluated based on a detailed operational analysis. Queue spillback from the Leesburg Pike Road/Patrick Henry Drive intersection may directly impact the circulation at a proposed access point for the site. If direct access to the site via Patrick Henry Drive is deemed necessary from an operational or circulation standpoint, alternative access configurations (such as right-in/right-out) should be considered to potentially mitigate impacts and conflicts between the two adjacent intersections.

Bicycle and Pedestrian Considerations

Bicycle and pedestrian infrastructure improvements should focus on creating a connected system of comfortable facilities. Existing bicycle and pedestrian facilities surrounding the Leesburg Pike Village are limited and often isolated. As such, improvements should be targeted at existing gaps in the network to help create a more holistic and complete system for pedestrians and bicyclists. Whether

utilizing existing roadway cross-sections to develop bike lanes or adding new infrastructure along site frontage, significant opportunities exist for connecting the Leesburg Pike Village with the surrounding neighborhoods. Establishing a connection between Juniper Lane and the site is likely the most important aspect in achieving this goal. Efforts should be made to either add infrastructure to the current cross-section of Juniper Lane, or in options where Juniper Lane is eliminated along the site frontage, mixed-use trails should be provided in its place. In addition to providing new infrastructure, any existing facilities proposed to remain should be modified to meet the current accessibility requirements established by in Americans with Disabilities Act (ADA) standards.

Design Considerations

The operational analysis illustrated many of the existing turn-lanes would not be able to accommodate projected 95th percentile queues during the weekday a.m. and p.m. peak hours. The length of turn-lanes and tapers serving site-generated trips should be evaluated for appropriateness based on anticipated levels of queuing, as well as VDOT and County design standards when the site is redeveloped.

Section 2
Introduction

INTRODUCTION

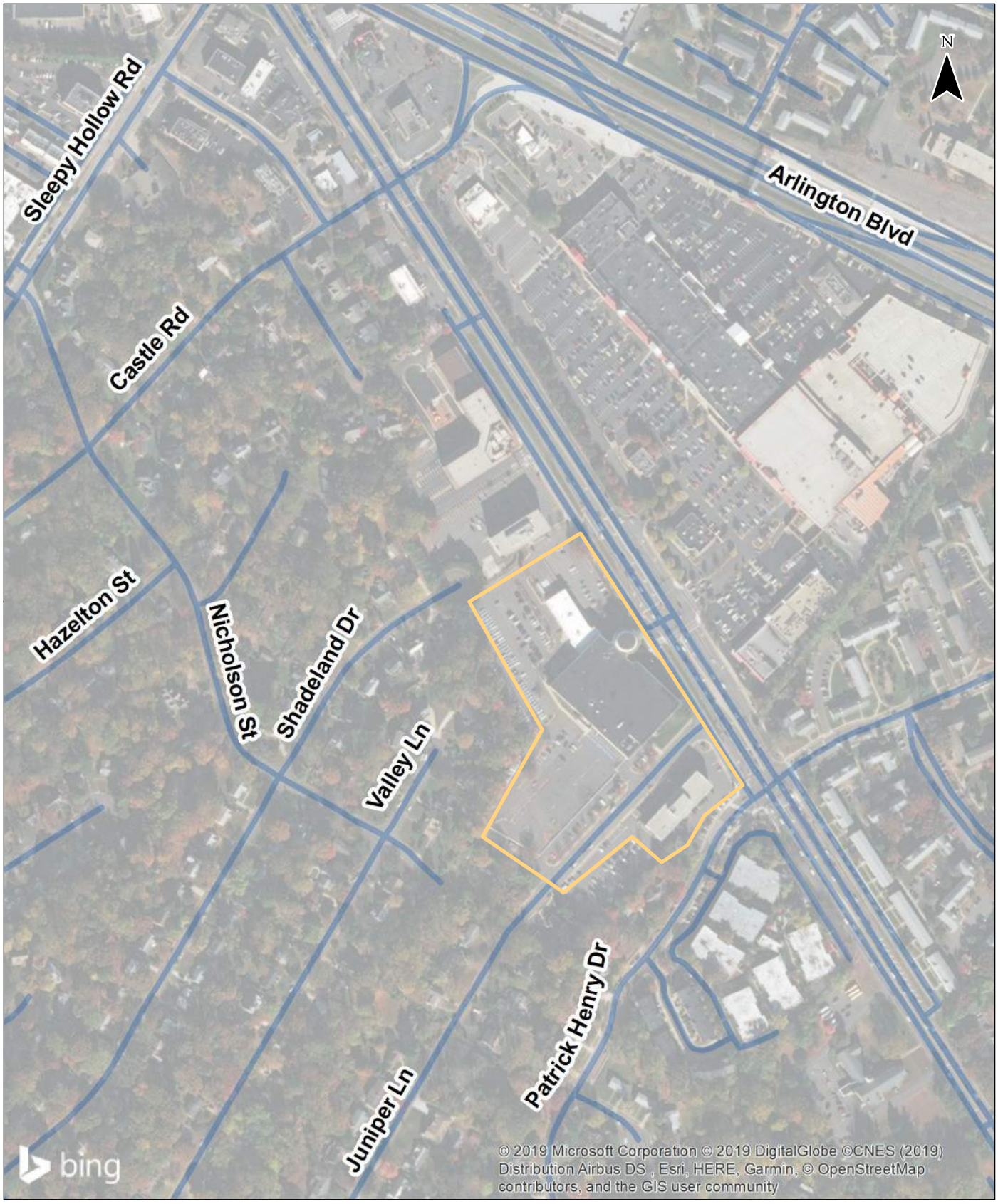
As Fairfax County grows and evolves, the County is undertaking measures to proactively plan for anticipated growth and development. In the Seven Corners area, the County Comprehensive Plan identifies the area adjacent to Leesburg Pike on the southwest side of the street, near Juniper Lane and Patrick Henry Drive, for potential redevelopment. This study attempts to identify a transportation network to be considered that would serve the development anticipated as part of the Comprehensive Plan.

The goal of this effort is to identify ways the roadway network can serve the potential new development appropriately, while limiting cut-through traffic and reducing possible development related traffic impacts. The study area contains the existing Sears Department store and office space at the northwest intersection of Patrick Henry and Leesburg Pike, shown in **Figure 4**. The study area is zoned commercial, with residential developments in the immediate vicinity of the site. **Figure 5** illustrates the current zoning map for the study area. The general topography of the study area can best be described as level to rolling-hill type terrain.

Fairfax County worked with community members to assess potential transportation network configurations in the study area. Eight scenarios were evaluated based on their potential impacts to the transportation system surrounding the study area and nearby neighborhoods, including, but not limited to, intersection delay, queuing, bicycle and pedestrian connectivity, and additional cut-through traffic. These eight options are shown in **Figure 6**. Of the eight options, three were selected for an expanded analysis. Ultimately, the intent of this document is to provide the County and the community with information and analysis useful for discussions with developers, should the area redevelop.

The analysis was prepared in accordance with Fairfax County and Virginia Department of Transportation (VDOT) requirements for traffic impact studies. Specifically, this analysis includes:

- A summary and analysis of year 2018 existing multimodal operational and safety conditions within the site vicinity;
- Future background transportation conditions with Sears Site redevelopment in accordance with the Comprehensive Plan;
- Trip generation and distribution estimates for the potential development program;
- Analysis of eight transportation concepts;
- Identification of issues and opportunities associated with bicycle, pedestrian, and transit travel upon Sears redevelopment; and,
- Conclusions and recommendations for the three preferred alternatives.



Study Area
Juniper Lane Connectivity Study

Figure
4

Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

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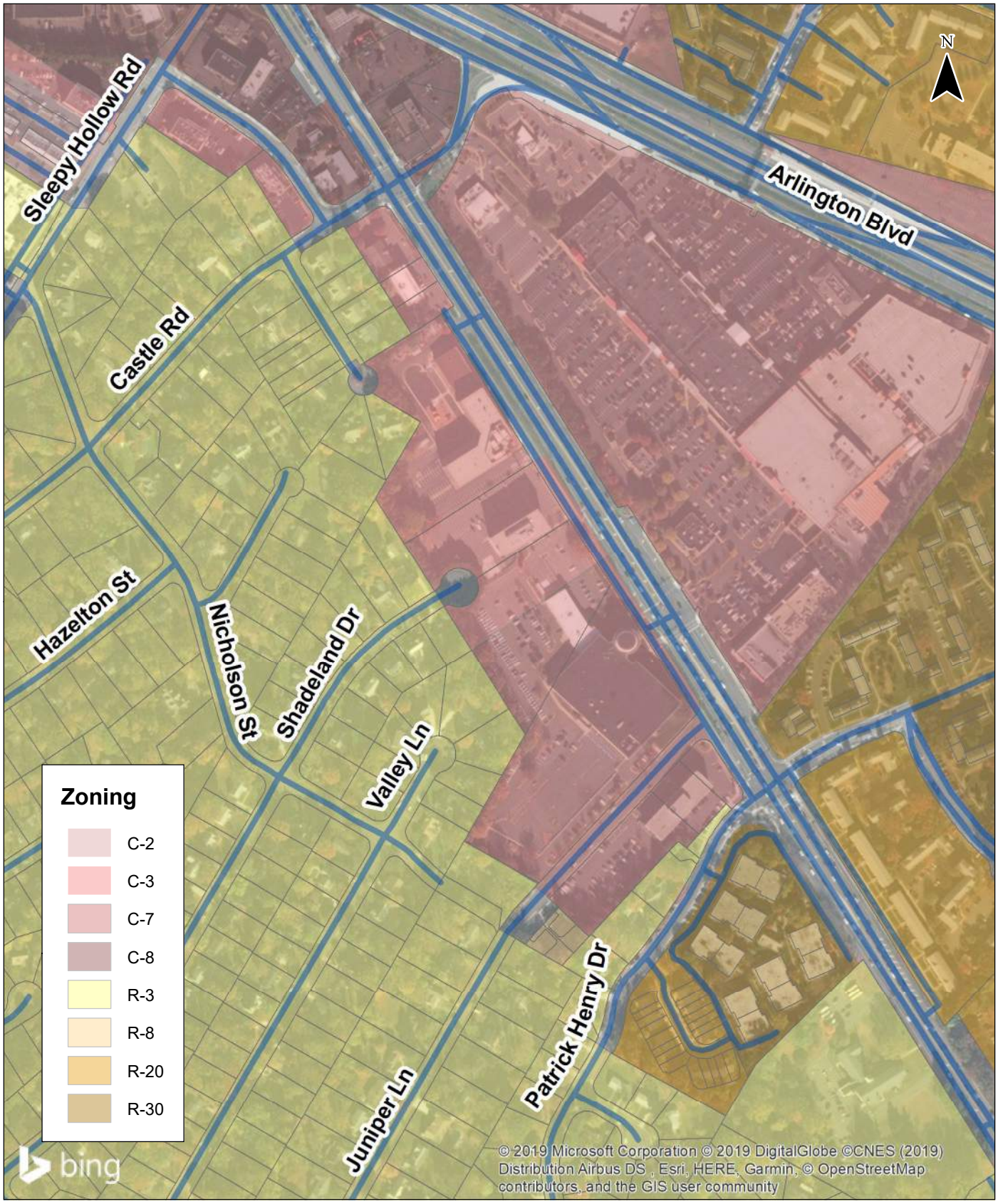

Existing Zoning
Juniper Lane Connectivity Study

Figure **5**

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Figure 6. Eight Conceptual Alignment Options for Leesburg Pike Village and Nearby Roadway Network

Previous Transportation and Land Use Studies

Land use is a key factor in developing a functional transportation system. The amount of land planned for development, the types of land uses, and how they relate to each other have a relationship to the anticipated demands for the transportation system.

The Comprehensive Plan identifies Leesburg Pike Village as one of three Opportunity Areas within the Seven Corners CBC, which is planned for form-based code instead of Floor Area Ratio (FAR) requirements. Redevelopment is incentivized within Opportunity Areas by emphasizing scale, land use, urban design, and function of future development. The Comprehensive Plan emphasizes that Opportunity Areas use transit-oriented development and function as activity nodes that have distinct character. The Comprehensive Plan includes illustrative concepts for the Leesburg Pike Village that include mixed-use development that provides higher building heights and higher density along Leesburg Pike, with smaller three-story townhomes abutting the residential periphery of the site.

The Comprehensive Plan highlights the need to revitalize the older, commercial centers that are showing signs of wear and deterioration within the Seven Corners CBC and Baileys Planning District. High speed, high capacity roadways fragment the CBCs and limit the areas for safe and comfortable bicycle and pedestrian facilities.

Comprehensive Plan Proposed Land Use

Under the Comprehensive Plan's Redevelopment Option, Leesburg Pike Village is planned to be redeveloped and organized around an internal street grid with a maximum of 539,000 square feet of mixed-use development. **Figure 7** displays a rendering of what the potential redevelopment might look like. The area could consists of townhomes, multifamily residential, retail, entertainment, and office uses. The Comprehensive Plan enumerates full development of the study area to consist of the following land uses:

- Residential Uses
    - 129,000 square feet of single-family attached housing
    - 275,000 square feet of multifamily housing
- Non-residential Uses
    - 50,000 square feet of neighborhood-serving office use
    - 40,000 square feet of neighborhood-serving retail use
    - 45,000 square feet of entertainment uses

Figure 7. Leesburg Pike Village from the Fairfax County Comprehensive Plan

Section 3
Existing Conditions

EXISTING CONDITIONS

Initial assessment of the study area included a thorough analysis of existing site conditions and current operational and geometric characteristics of the roadways. Kittelson & Associates, Inc. (KAI) staff visited and inventoried the existing Sears site and surrounding study area to collect information regarding site conditions, adjacent land uses, existing traffic operations, turning movement counts, and transportation facilities in the study area. The study intersections, time periods for analysis, and scope of this project were selected after consulting with Fairfax County staff.

TRANSPORTATION FACILITIES

A site visit was conducted to inventory the existing transportation facilities within and surrounding the study area. The inventory includes an assessment of existing vehicular, transit, bicycle, and pedestrian facilities.

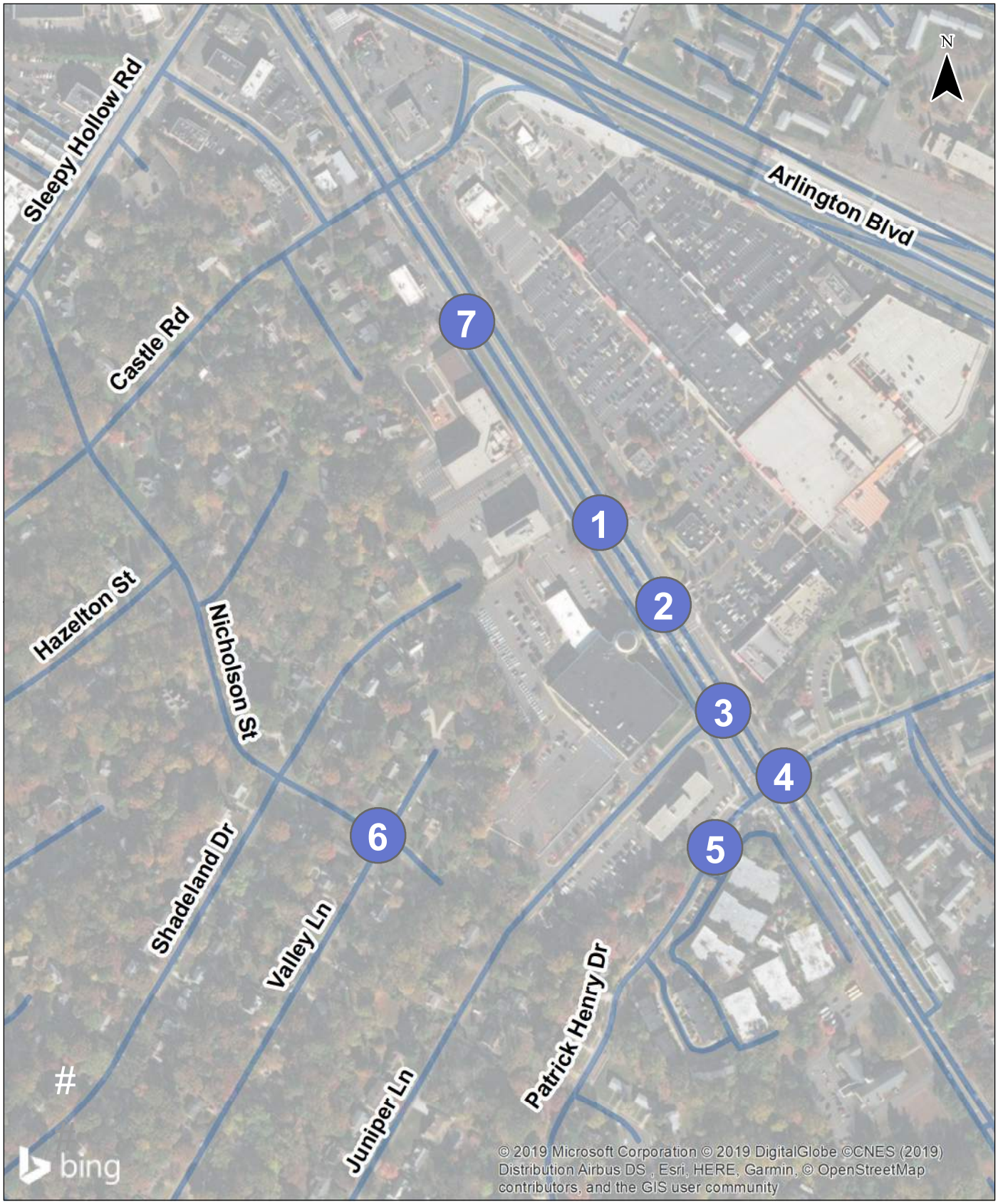
Vehicular Facilities

The study area and study intersections are shown in **Figure 8** and include:

1. Leesburg Pike Service Road / Leesburg Pike Driveway / Sears Driveway
2. Leesburg Pike Service Road / Leesburg Pike / Seven Corners Center / Sears Driveway
3. Leesburg Pike Service Road / Juniper Lane
4. Leesburg Pike Service Road / Patrick Henry Drive / Leesburg Pike
5. Patrick Henry Drive / Retail Driveway / Apartment Complex Driveway
6. Nicholson Street / Valley Lane
7. Leesburg Pike Service Road / Bailey's Upper Elementary School[1]

The street network is the essential component to the transportation system within the study area. Motor vehicle, bicycle, pedestrian, transit, and freight transportation all rely on the street network for mobility purposes. The following section describes the street network's classifications and general characteristics. **Table 1** summarizes the primary roadways in the site vicinity. **Figure 9** and **Figure 10** show existing roadways classifications and speed limits, respectively.

[1] Traffic counts were collected for intersection 7, but no traffic operations were analyzed.



Traffic counts were collected for intersection 7, but no traffic operations were analyzed.

Study Intersections
Juniper Lane Connectivity Study

Figure **8**

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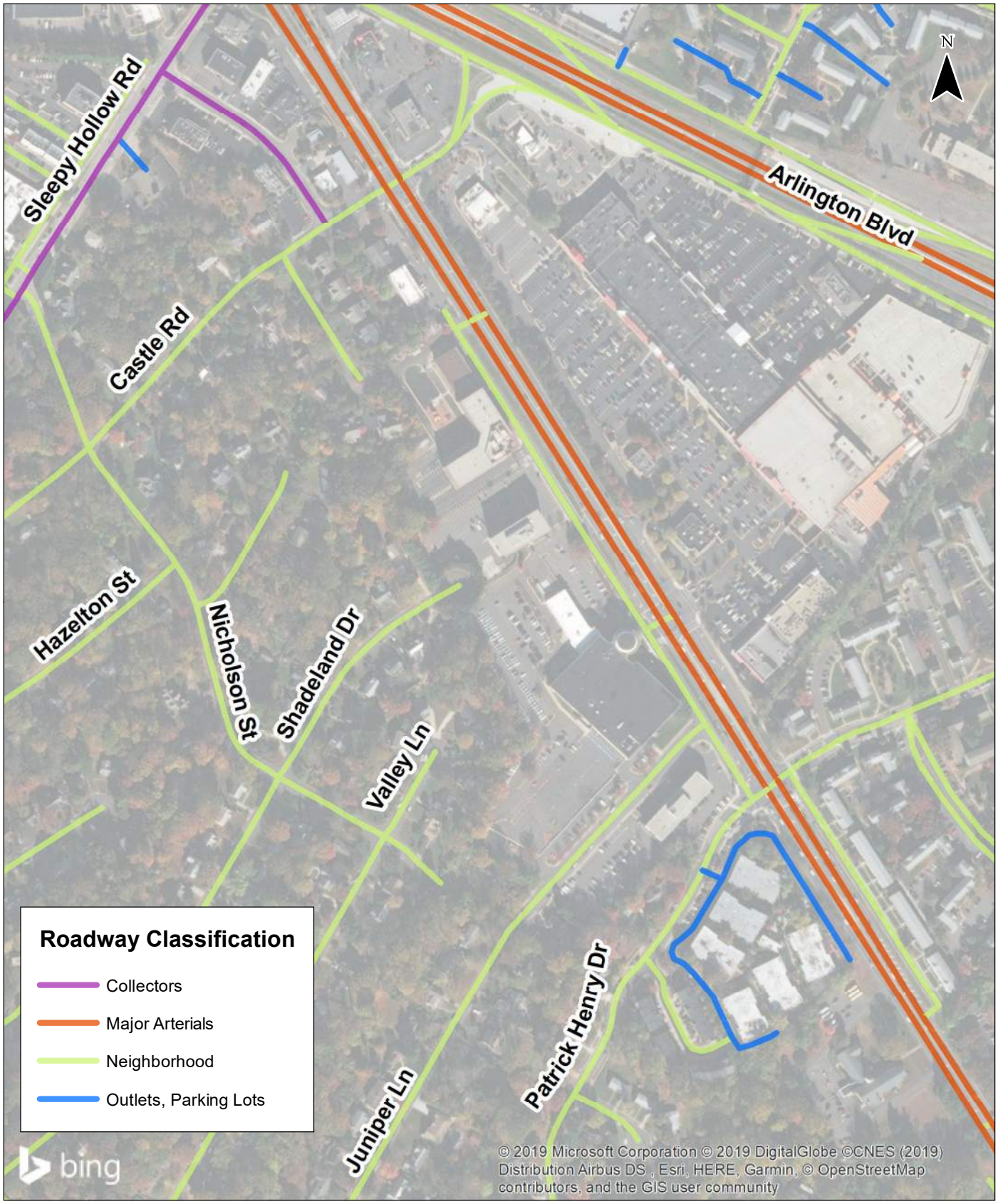

Roadway Classification
Juniper Lane Connectivity Study

Figure **9**

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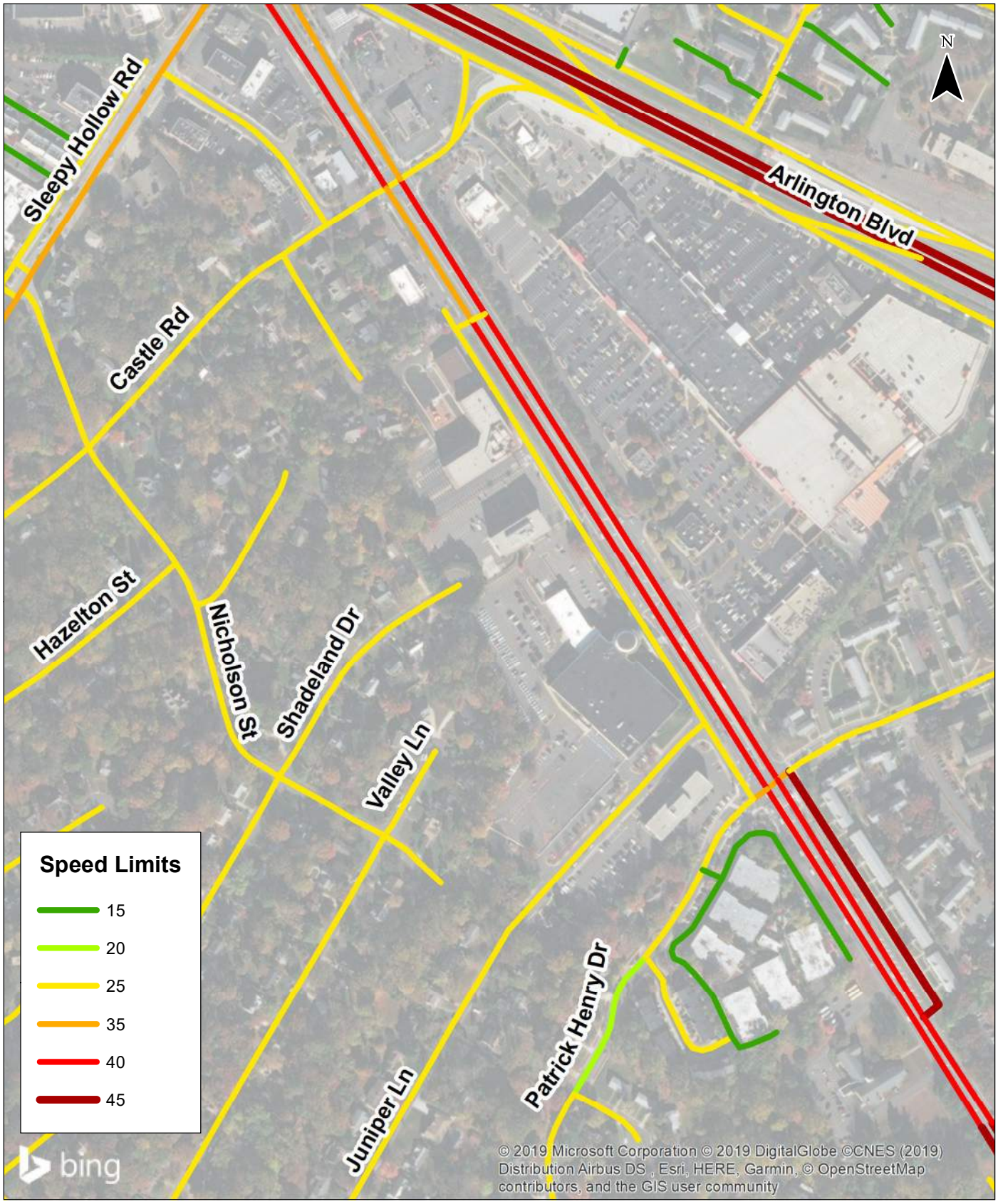

Roadway Speeds
Juniper Lane Connectivity Study

Figure
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Table 1. Existing Transportation Facilities and Roadway Designations

Roadway	Classification1	Number of Lanes	Speed Limit (mph)	Median	Side-walks	Bicycle Lanes	On-Street Parking	Surface
Leesburg Pike Service Road	Neighborhood	2	25	No	Yes	No	No	Paved
Leesburg Pike	Major Arterial	6	40	Partial	Partial	No	No	Paved
Patrick Henry Drive	Neighborhood	2	25	No	Yes	No	Yes	Paved
Sleepy Hollow Road	Collector	2	35/25	No	Partial	No	Yes	Paved
Juniper Lane	Neighborhood	2	25	No	Partial	No	Yes	Paved
Nicholson Street	Neighborhood	2	25	No	No	No	No	Paved
Valley Lane	Neighborhood	2	25	No	No	No	Yes	Paved

[1]Classifications based on Fairfax County's Roadway Centerlines GIS Shapefile (2018)

A street's functional classification defines its role in the transportation system and reflects desired operational and design characteristics such as right-of-way requirements, pavement widths, pedestrian and bicycle features, and driveway (access) spacing standards. Functional classification is determined by several factors, including how the facility connects with the rest of the system, the volume of local or through traffic it is expected to carry, and the different types of trips it is expected to support.

The majority of the roads in the study area are designated as Local Neighborhood roadways with a speed limit of 25 mph, with the exception of Leesburg Pike and Sleepy Hollow Road. Leesburg Pike is classified as a 40 mph Major Arterial, with six total lanes.

Transit Facilities

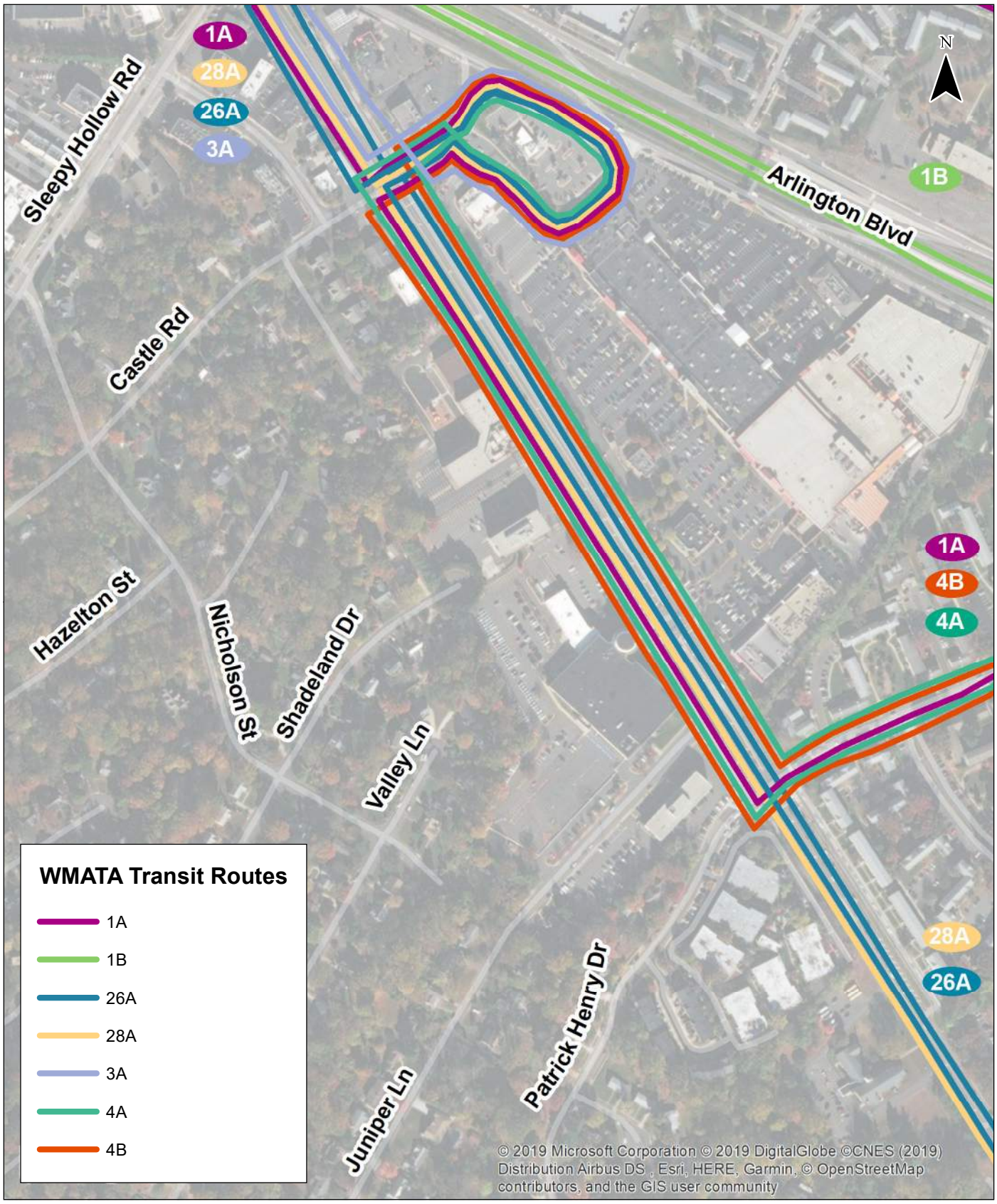
The study area is serviced by five WMATA bus routes, as shown in **Figure 11.** The Seven Corners Transit Center and Bus bay is located off Leesburg Pike, within the vicinity of the study area. The bus stop located nearest the study area is located at the intersection of Patrick Henry Drive and Leesburg Pike, as shown from the site visit photos displayed in **Figure 12**. This stop is serviced by routes 26A and 28 A. Other bus stops are located across the street at the Seven Corners Shopping Center and to the north near Castle Road and Leesburg Pike, serviced by routes 1A, 4A, 4B, 26A, and 28A. The bus stops are spaced approximately 450-1100 feet apart and are located on Leesburg Pike and Patrick Henry Drive. The following WMATA bus routes provide service within the site vicinity:

- 1 A, B Wilson Boulevard – Vienna
    - East-West service connecting Vienna Station, Dunn Loring Station, and Ballston-MU Metro Stations.
- 3 A Annandale Road
    - North-South service connecting Annandale to East Falls Church Metro Station.

- 4 A, B Pershing Drive – Arlington Boulevard
    - East-West service from Seven Corners Transit Center to Court House Metro Station and Rosslyn Metro Station.
- 26 A Annandale – East Falls Church
    - East-West service from Northern Virginia Community College to East Falls Church Metro Station.
- 28 A Leesburg Pike
    - North-South service from King Street Old Town Metro Station to West Falls Church and Tysons Corner Metro Stations.

Table 2. WMATA Transit Routes within the Study Area Vicinity

Route	Direction	Weekday Hours of Operation	Peak Hour Headway	All Day Service	Weekend Service
1 A, B	East-West	5:35 AM – 12:30 AM	12-25 min	Yes	Yes
3 A	North-South	5:40 AM – 8:45 PM	30 min	Yes	Yes
4 A, B	East-West	5:05 AM – 11:30 PM	15 min	Yes	Yes
26 A	East-West	6:00 AM – 7:00 PM	30 min	Yes	No
28 A	North-South	4:18 AM – 12:15 PM	20 min	Yes	Yes



Transit Routes
Juniper Lane Connectivity Study

Figure
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Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

(A) **(B)**

Figure 12. Transit Shelter at Patrick Henry Drive (A) and Leesburg Pike (B)

Pedestrian and Bicycle Facilities

This section summarizes key existing conditions findings for pedestrian and bicycle facilities in the study area. Pedestrian and bicycle facilities serve as the framework of the active transportation network. Active transportation is often referred to as "human-powered" transportation and includes walking, traveling with a mobility aid, biking, and using other wheeled devices like skateboards to access destinations such as parks, grocery stores, transit stops, and other essential destinations. Field observations revealed low levels of pedestrian and bicycle activity along the study area roadways during most hours of the day. **Figure 13** displays observations from a site visit and **Figure 14** shows a map of pedestrian facilities in the study area.

Sidewalks are provided only along the major roadways throughout the corridor, including Leesburg Pike, Patrick Henry Drive, and part of Juniper Lane. Smaller neighborhood roadways, such as Nicholson Street, Valley Lane, Shadeland Drive, and part of Juniper Lane lack sidewalks. The existing sidewalks are less than five feet wide and there are several gaps in the network. The Federal Highway Administration established a minimum sidewalk width of five feet if set back from the curb, and six feet if the sidewalk is located directly adjacent to the curb. These facilities provide residents the ability to access local retail/commercial centers, recreational areas, and other land uses by foot.

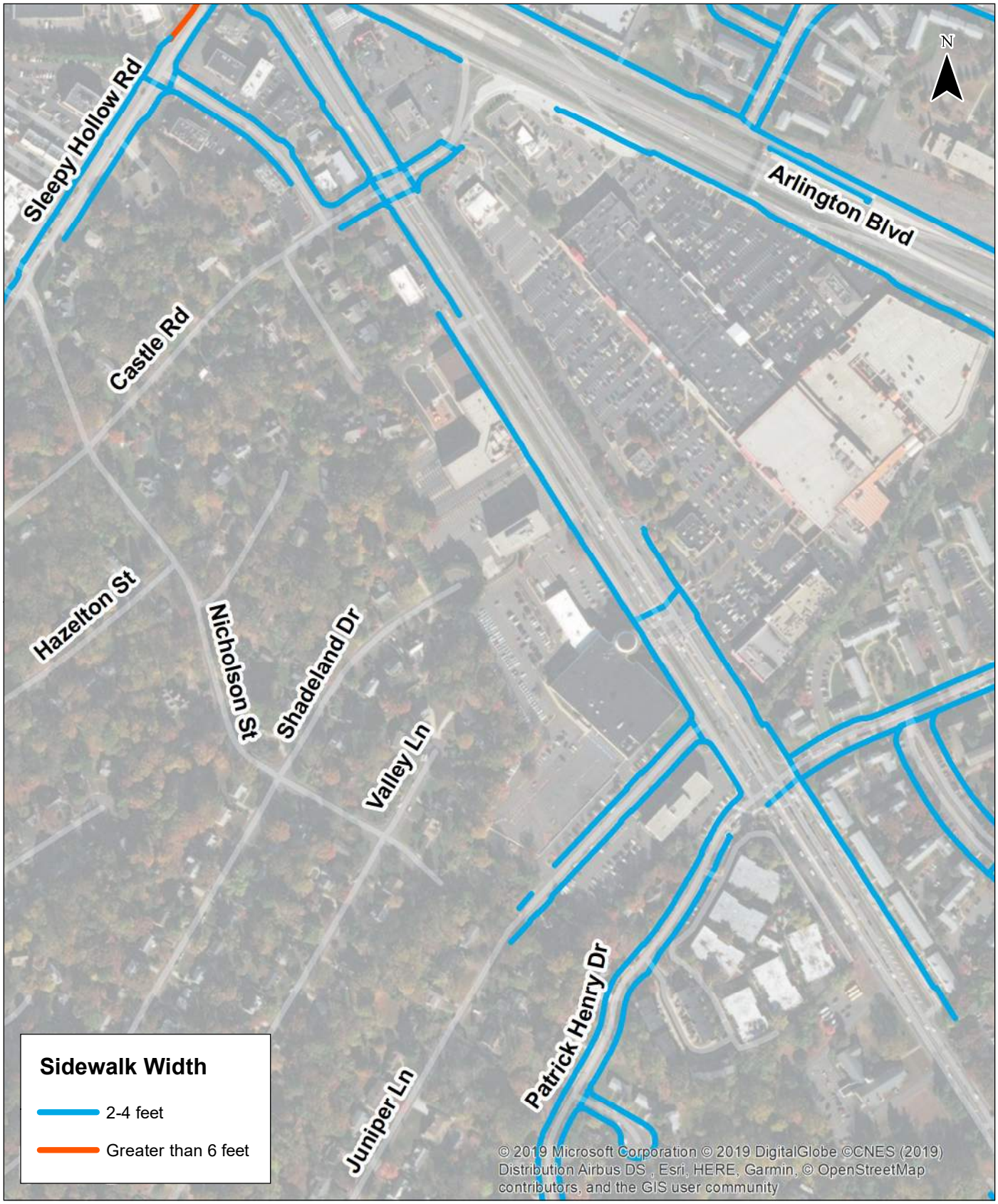
Crosswalk striping along the Leesburg Pike Service Road has faded and is no longer visible. A painted crosswalk is present at the intersection of Patrick Henry Drive and the Leesburg Pike Service Road, as shown in **Figure 13**. There are two pedestrian refuge islands present on the southside crossing at the intersection of Patrick Henry Road and Leesburg Pike. The crossing distance required to cross Leesburg Pike is a total of 100'. The pedestrian refuge islands divide the crossing distance into 35', 42', and 20' segments. The study area's closest bus stop is located on the southeast corner of the Patrick Henry Drive and Leesburg Pike intersection, making this a critical crosswalk. There is no northside crossing available at this intersection. Similarly, there is no northside crosswalk available at the intersection of

Leesburg Pike and the Seven Corners Center. The intersection has a southside crosswalk that is over 100’ and has no pedestrian refuge island.

(A) **(B)**

(C)

Figure 13. (A), (B), and (C) Pedestrian Crossing at the intersection of Patrick Henry Drive/Leesburg Pike



Sidewalk Facilities
Juniper Lane Connectivity Study

Figure
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Bicycle facilities within the study area are limited. Multiple high stress multi-lane roads divide the study area, discouraging bicycle travel in the study area. The Fairfax County Bicycle Map designates the sidewalk along Sleepy Hollow Road as a Bikeable Sidewalk. Otherwise, bicyclists are required to share the roadway with vehicles. **Figure 15** displays the area's wide roads and lack of bicycle infrastructure along Juniper Lane and Leesburg Pike. **Figure 16.** displays the Bicycle Level of Traffic Stress (LTS). LTS is a methodology developed by the Mineta Transportation Institute to evaluate the stress that bicyclists experience on roadway segments, intersection approaches, and unsignalized crossings[2]. Using this approach, a street network can be classified into four stress levels, ranging from low stress to high stress. The LTS methodology utilized by FCDOT identifies four stress levels based on key facility and traffic factors:

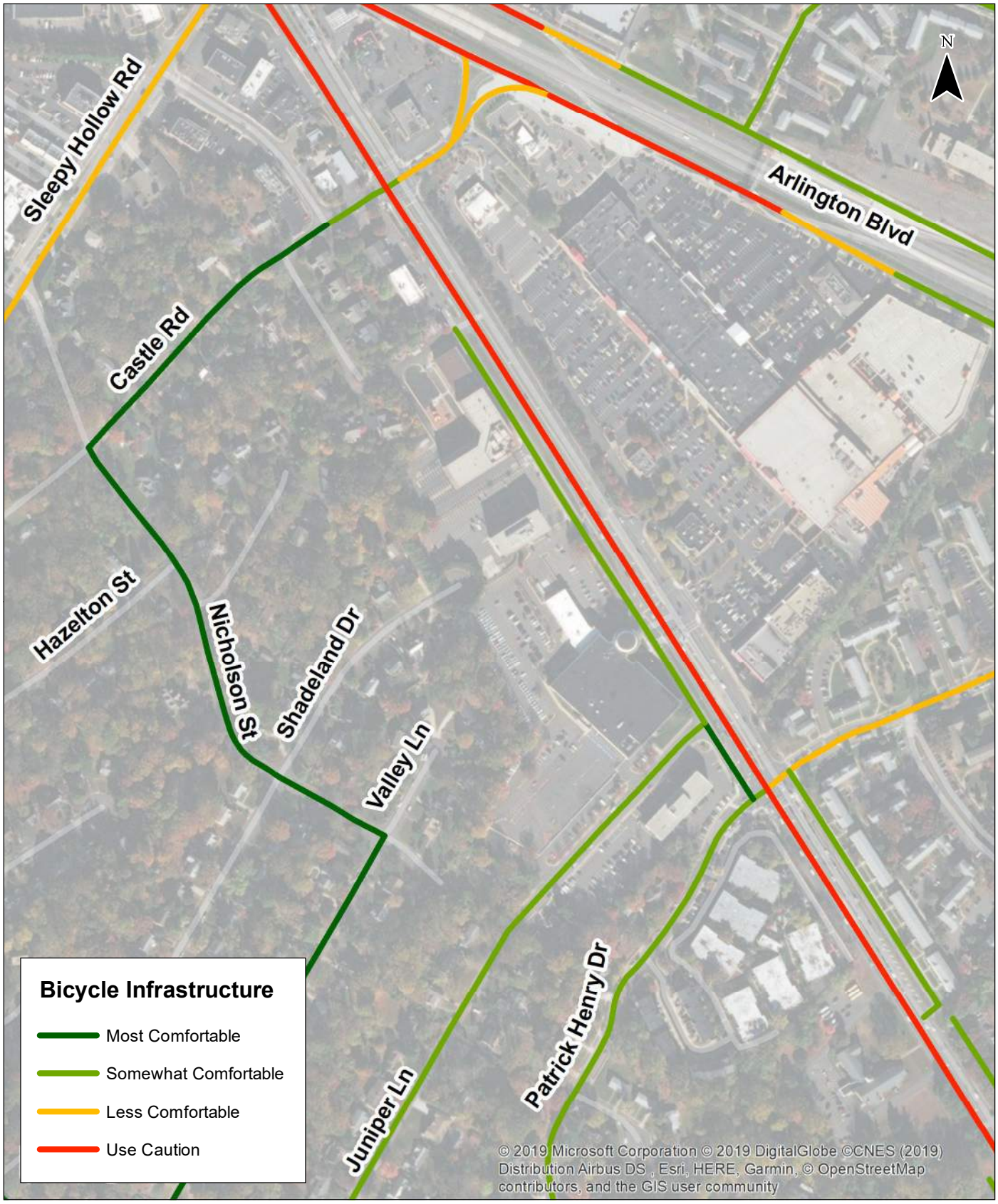
- Use Caution — High stress, only suitable for experienced bicyclists.
- Less Comfortable — Moderate traffic stress for all bicyclists.
- Somewhat Comfortable — Low traffic stress and suitable for most adults.
- Most Comfortable — Requires little attention to surroundings; suitable for most children.

Local Neighborhood streets tend to be rated "Most Comfortable," with some rated as "Somewhat Comfortable". Leesburg Pike is rated, "Use Caution," due to high speeds, a wide roadway width, and limited bicycle infrastructure. Nicholson Street provides a safer, more comfortable parallel North-South connection for cyclists.

(A) **(B)**

Figure 15. Juniper Lane (A) and Leesburg Pike (B) Field Visit Observations

[2] Maaza C. Mekuria, Peter G. Furth, and Hilary Nixon. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute. 2012. Accessed October 24, 2018. https://transweb.sjsu.edu/research/low-stress-bicycling-and-network-connectivity



Existing Bicycle Infrastructure
Juniper Lane Connectivity Study

Figure **16**

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Existing Traffic Volumes and Peak Hour Operations

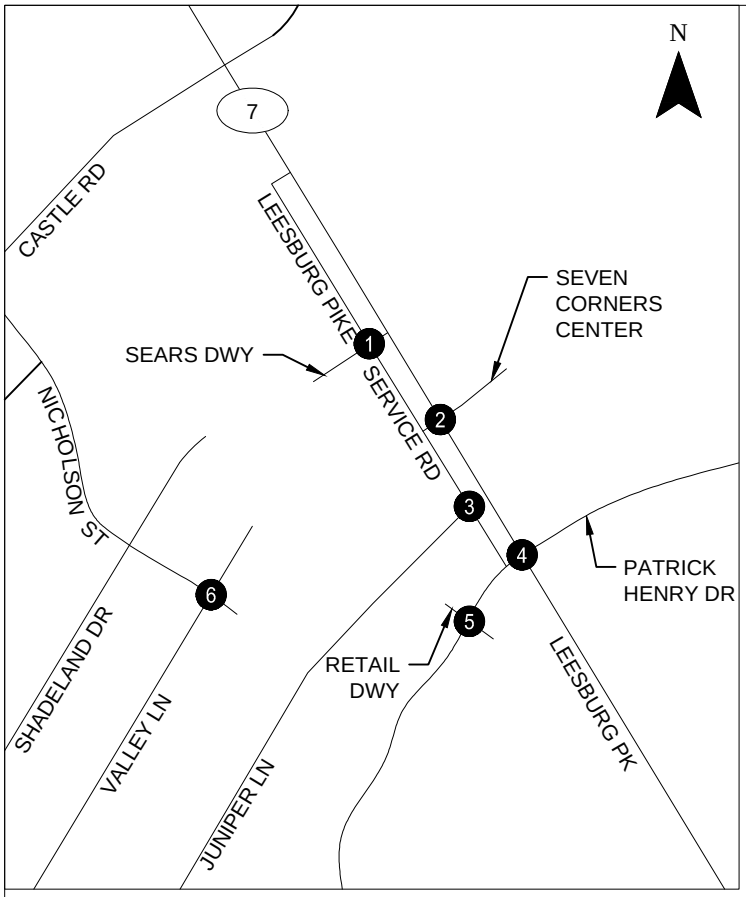
Turning-movement counts were obtained in April 2018 at all existing study intersections. The counts were conducted on a typical weekday morning (6:00 – 9:00 a.m.) and weekday evening (4:00 – 7:00 p.m.) during peak time periods when school was in session. ***Appendix A*** *contains all turning movement count data sheets.*

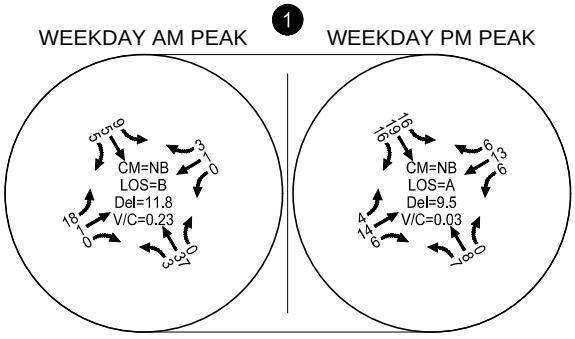
Current Levels of Service

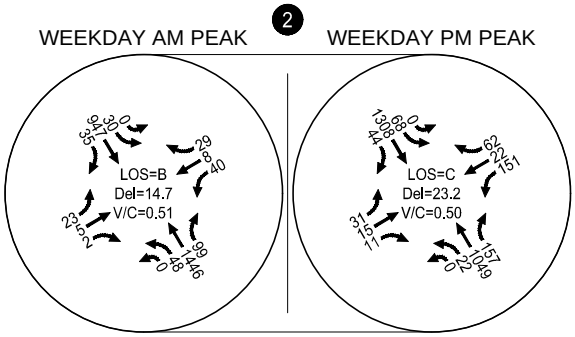
All level of service (LOS) analyses described in this report was performed in accordance with the procedures stated in the 2010 *Highway Capacity Manual* and report HCM 2000 outputs (Reference 3). *A description of level of service and the criteria by which they are determined is presented in* ***Appendix B****.*

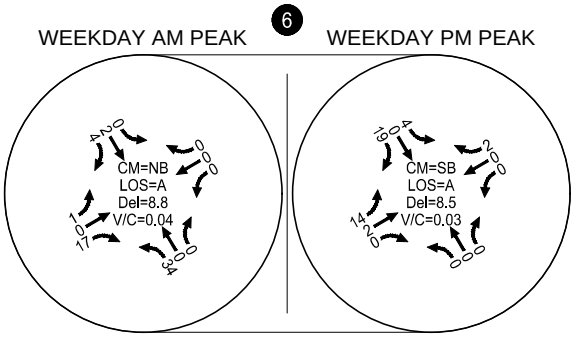
This analysis is based on the system hourly peak during each of the study periods to evaluate of all intersection levels-of-service. The weekday a.m. and weekday p.m. peak hours were found to occur from 7:30 a.m. to 8:30 a.m. and 5:15 p.m. to 6:15 p.m., respectively. Traffic operations were evaluated using Synchro 10.

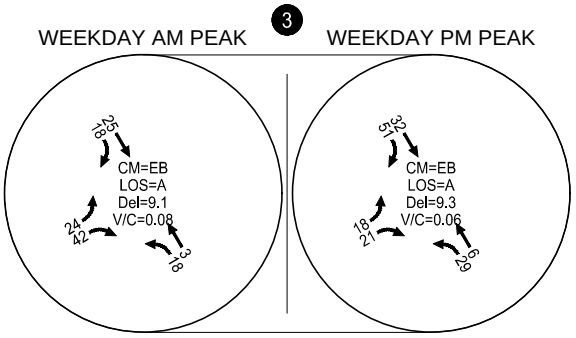
Figure 17 shows the overall intersection operational results of the existing traffic operations analysis for the weekday a.m. and weekday p.m. peak hours. **Table 3** summarizes the Synchro 10 peak hour levels of service, 95th percentile back of queue, and delay for each lane group by intersection. ***Appendix C*** *contains the existing conditions level of service worksheets.*

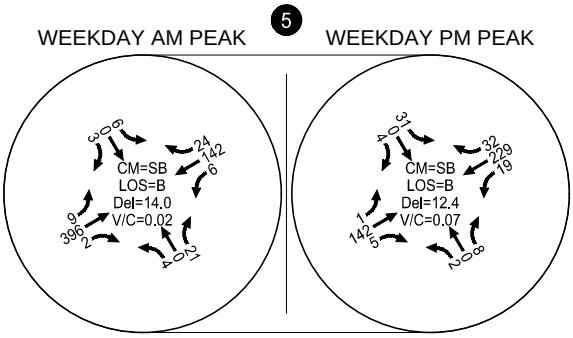


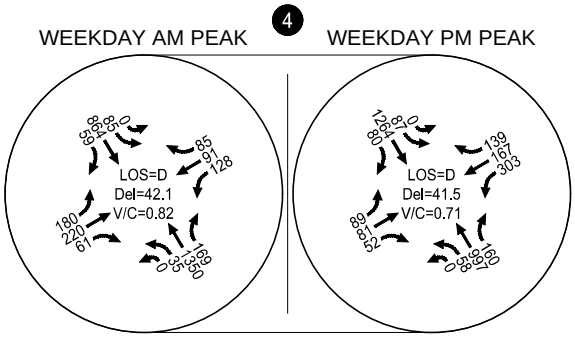












Existing Traffic Conditions
Weekday AM and PM Peak Hours
Fairfax County, VA

Figure
17

Table 3. Existing Traffic Conditions – Summary of Peak Hour Levels of Service, 95th Percentile Back of Queue, and Delay for Each Lane Group by Intersection

Intersection Information					AM Peak Hour			PM Peak Hour		
Intersection	Traffic Control	Approach	Lane Group	Existing turn-lane lengths	LOS	Back of Queue (feet)	Delay (sec)	LOS	Back of Queue (feet)	Delay (sec)
Leesburg Pike/Leesburg Pike Service Road/Sears Driveway (#1)	Two-Way Stop-Controlled[1]	EB	EBLTR	-	A	4	7	A	0	1.3
		EB Approach					7			1.3
		WB	WBLTR	-		0	0	A	0	1.8
		WB Approach					0			1.8
		NB	NBLTR	-	B	22	11.8	A	2	9.5
		NB Approach			B		11.8	A		9.5
		SB	SBLTR	-	B	9	11	A	6	9.4
		SB Approach			B		11	A		9.4
Leesburg Pike/Leesburg Pike Service Road/Seven Corners Center (#2)	Signalized	EB	EBLTR	-	B	13	12	A	15	9.8
		EB Approach			B		12	A		9.8
		WB	WBL	150	E	64	74.9	E	150	72.8
			WBLT	-	E	64	74.7	E	152	73
			WBR	105	E	0	71.9	E	0	65.8
		WB Approach			E		73.7	E		71
		NB	NBL	175	A	m9	4.1	A	m6	7
			NBT	-	A	113	6.3	A	98	8.5
			NBR	320	B	m1	17.4	A	0	0.2
		NB Approach								
		SB	SBL	570	B	29	17.8	B	66	19.5
			SBT	-	C	284	22.7	C	480	30.3
			SBR	165	B	42	18.2	C	59	22.5
		SB Approach			C		22.4	C		29.5
		Overall Intersection			B		14.7	C		23.2
Leesburg Pike Service Road/ Juniper Lane (#3)	Two-Way Stop-Controlled	EB	EBLR	-	A	7	9.1	A	5	9.3
		EB Approach			A		9.1	A		9.3
		NB	NBLR	-	A	1	6.3	A	2	6.3
		NB Approach					6.3			6.3
		SB	SBLR	-		0	0		0	0
		SB Approach					0			0
Leesburg Pike/ Patrick Henry Drive (#4)	Signalized	EB	EBL	100	A	m10	2.2	A	m7	4.2
			EBTR	-	A	m38	4.8	A	20	5.1
		EB Approach			A		3.8	A		4.8
		WB	WBR	260	F	193	80.6	F	#441	103.7
			WBTR	-	F	201	81.8	F	#452	101.4
			WBR	260	E	70	60	D	114	54.2
		WB Approach			E		75.3	F		91.5
		NB	NBL	380	C	46	29.7	C	64	31.4
			NBTR	545	E	#745	58.7	D	461	45
		NB Approach			E		58.1	D		44.3
		SB	SBL	215	E	114	79	D	98	42.1
			SBT	-	C	338	20.3	C	121	22.6
			SBR	140	B	36	14.1	B	32	16.7
		SB Approach			C		24.9	C		23.5
		Overall Intersection			D		42.1	D		41.5

Intersection Information					AM Peak Hour			PM Peak Hour		
Intersection	Traffic Control	Approach	Lane Group	Existing turn-lane lengths	LOS	Back of Queue (feet)	Delay (sec)	LOS	Back of Queue (feet)	Delay (sec)
Patrick Henry Drive/ Retail Driveway/ Apartment Driveway (#5)	Two-Way Stop-Controlled	EB	EBLTR	-	A	1	0.2	A	0	0.1
		EB Approach					0.2			0.1
		WB	WBLTR	-	A	0	0.3	A	1	0.6
		WB Approach					0.3			0.6
		NB	NBLTR	-	B	4	12.1	A	1	9.8
		NB Approach			B		12.1	A		9.8
		SB	SBLTR	-	B	2	14	B	6	12.4
		SB Approach			B		14	B		12.4
Valley Lane/ Nicholson Street (#6)	Two-Way Stop-Controlled	EB	EBLTR	-	A	0	0.3	A	1	6.3
		EB Approach					0.3			6.3
		WB	WBLTR	-		0	0		0	0
		WB Approach					0			0
		NB	NBLTR	-	A	3	8.8	A	0	0
		NB Approach			A		8.8	A		0
		SB	SBLTR	-	A	1	8.6	A	2	8.5
		SB Approach			A		8.6	A		8.5

[1]Intersection currently features three stop-controlled approaches and a single uncontrolled approach. As this configuration is not permitted in HCM analysis, the Sears driveway approach was modeled as uncontrolled. Analysis provides approximate operational conditions.

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

95th percentile volume exceeds capacity, queue may be longer.

As shown in **Table 3,** study intersections are anticipated to operate at LOS D or better. Notable delay within the study area include:

Leesburg Pike/Leesburg Pike Service Road/Seven Corners Center

The signalized intersection currently operates at an overall LOS B during the AM peak and LOS C during the PM peak. However, the westbound approach operates at a notably higher LOS than the other approaches. All westbo und turning movements operate at a LOS E. The Seven Corners Center has separated left and right turn lanes. The Seven Corners shopping center has another entry/exit point located 250-feet to the north. This access point is right-in, right-out only.

Leesburg Pike / Patrick Henry Drive

The signalized intersection currently operates at LOS D during the AM and PM peak hours. The westbound approach from Patrick Henry Drive experiences the highest delay, with a LOS E during the AM peak and LOS F during the PM peak. The westbound right and westbound through movements are LOS F during AM and PM peak hours. The northbound approach on Leesburg Pike is LOS E during the AM peak and LOS D during the PM peak. The northbound through movement experiences the longest delay.

Section 4

Analysis of Site Impacts

ANALYSIS OF SITE IMPACTS

As identified in the Fairfax County Comprehensive Plan, 2017 Edition, Land Unit C of the Seven Corners Community Business Center (CBC) is envisioned to redevelop into a 539,000 square-foot mixed-use development. While there is no current proposal for redevelopment, the intent of this evaluation is to analyze the potential impacts to the study area's transportation network if the Leesburg Pike Village were to come to fruition. The analysis is meant to both inform and provide guidance on the effects of proposed changes to the roadway network by evaluating impacts of the site on both the existing roadway network and several potential alternative network configurations. Specifically, this analysis includes discussions of:

- Potential development
    - Assumed levels of development and land uses
    - Trip generation
    - Trip distribution
- Impacts of proposed development on existing roadway network (i.e., if the site were to redevelop without changes to the roadway network)
    - Assignment of pass-by and net-new trips
    - Weekday a.m. and weekday p.m. peak hour operations
- Proposed options for evaluation
    - Assumptions for each option
    - Rerouting of existing trips on proposed roadway network for each option
    - Assignment of pass-by and net-new trips for each option
    - Weekday a.m. and weekday p.m. peak hour operations of each option
- Analysis of benefits and trade-offs for each option

PROPOSED DEVELOPMENT

As identified in the Fairfax County Comprehensive Plan, 2017 Edition, the Leesburg Pike Village is envisioned to redevelop into a 539,000 square-foot mixed-use development. It is meant to serve as a gateway and transition area between the Seven Corners CBC to the surrounding neighborhoods. The Comprehensive Plan calls for the full development to consist of the following land uses:

- Residential Uses
    - 129,000 square feet of single-family attached housing
    - 275,000 square feet of multifamily housing
- Non-residential Uses
    - 50,000 square feet of neighborhood-serving office use
    - 40,000 square feet of neighborhood-serving retail use
    - 45,000 square feet of entertainment uses

Trip Generation

To estimate the number of trips generated by these proposed land uses, estimates for the proposed Leesburg Pike Village were developed using the standard reference *Trip Generation Manual, 10th Edition* (Reference 4) published by the Institute of Transportation Engineers (ITE). While exact land uses to be developed on the site have not yet been determined, the methodology in ITE's Trip Generation Manual requires the application of specific land uses (e.g., 45,000 square feet of entertainment uses must be disaggregated into specific business types). As such, a set of specific land uses were assumed after discussions with FCDOT staff and are shown in **Table 4**.

The actual land uses developed on the Leesburg Pike Village site in the future will likely vary from those assumed in this study; however, these land uses have been determined to represent a reasonable development scenario concurrent with the current Comprehensive Plan.

Table 4. Estimated Trip Generation

Land Use	ITE Code	Units		Weekday Daily	Peak Hour Adjacent Street					
					Weekday AM Peak Hour			Weekday PM Peak Hour		
					Total	In	Out	Total	In	Out
Residential Land Uses[1]										
Multi-family Housing (Low-Rise)	220	65	Dwelling units	451	32	7	25	40	25	15
Multi-family Housing (Mid-Rise)	221	275	Dwelling units	1,497	99	26	73	121	74	47
Total Residential Uses				**1,948**	**131**	**33**	**98**	**161**	**99**	**62**
Internal Trips (15% of residential trips)[2]				*(292)*	*(20)*	*(4)*	*(14)*	*(24)*	*(14)*	*(10)*
Net-New Residential Trips				**1,656**	**111**	**29**	**84**	**137**	**85**	**52**
Recreational Land Uses										
Bowling Alley[3]	437	25.000	1,000 S.F.	173	37	35	2	26	17	9
Movie Theater[4]	444	20.000	1,000 S.F.	1,562	4	2	2	80	75	5
Net-New Recreational Trips				**1,735**	**41**	**37**	**4**	**106**	**92**	**14**
Office Land Uses										
General Office Building	710	50.000	1,000 S.F.	542	73	63	10	59	9	50
Internal Trips (5% of office trips)[2]				*(28)*	*(4)*	*(2)*	*(2)*	*(2)*	*(1)*	*(1)*
Net-New Office Trips				**542**	**69**	**61**	**8**	**57**	**8**	**49**
Retail Land Uses										
Apparel Store[4]	876	10.000	1,000 S.F.	664	10	8	2	41	21	20
Pharmacy/Drug Store without Drive-Through Window	880	10.000	1,000 S.F.	901	27	18	9	85	42	43
Pass-bys (53% AM/PM)				*(478)*	*(14)*	*(7)*	*(7)*	*(46)*	*(23)*	*(23)*
Fast Casual Restaurant	930	8.000	1,000 S.F.	2,521	17	11	6	113	62	51
Pass-bys (43% AM/PM)				*(1,084)*	*(8)*	*(4)*	*(4)*	*(48)*	*(24)*	*(24)*
Quality Restaurant	931	12.000	1,000 S.F.	1,006	9	5	4	94	63	31
Pass-bys (44% AM/PM)				*(442)*	*(4)*	*(2)*	*(2)*	*(42)*	*(21)*	*(21)*
Total Retail Uses				5,092	63	42	21	333	188	145
Retail Pass-by Total				(2,004)	(26)	(13)	(13)	(136)	(68)	(68)
Net-New Retail Trips				**3,088**	**37**	**29**	**8**	**197**	**120**	**77**
Total External Trips				9,025	286	169	117	633	373	260
Total Pass-bys				(2,004)	(26)	(13)	(13)	(136)	(68)	(68)
Total Net-New Trips				**7,021**	**260**	**156**	**104**	**497**	**305**	**192**

[1]Per discussions with FCDOT staff, multifamily and single-family dwelling units assumed to occupy 1,000 and 2,000 S.F., respectively.

[2]Per 24VAC30-155-60 (VDOT TIA Administrative Guidelines)

[3]Weekday Daily trip generation rates not available. Assumed Weekday PM Peak Hour trips represent 15% of daily trips.

[4]Only single observational study available.

As shown in **Table 5**, the development is estimated to generate approximately 7,021 net new weekday daily trips, 260 weekday a.m. (156 in, 104 out), and 497 weekday p.m. (305 in, 192 out) peak hour trips when fully built out.

Assignment of Land Uses to Specific Parcels

For the purpose of assigning trips to specific site access points on the roadway network, the land uses were assigned to parcels within the proposed Leesburg Pike Village development. **Figure 18** illustrates the location of each parcel.

(Rendering Source: Fairfax County Comprehensive Plan)

Figure 18. Leesburg Pike Village Parcels

The land uses assumed on each parcel are as follows:

- Parcel 1
    - 25,000 S.F. bowling alley
    - 20,000 S.F. movie theatre
    - 25,000 S.F. of office
    - 10,000 S.F. apparel store
    - 10,000 pharmacy
- Parcel 2

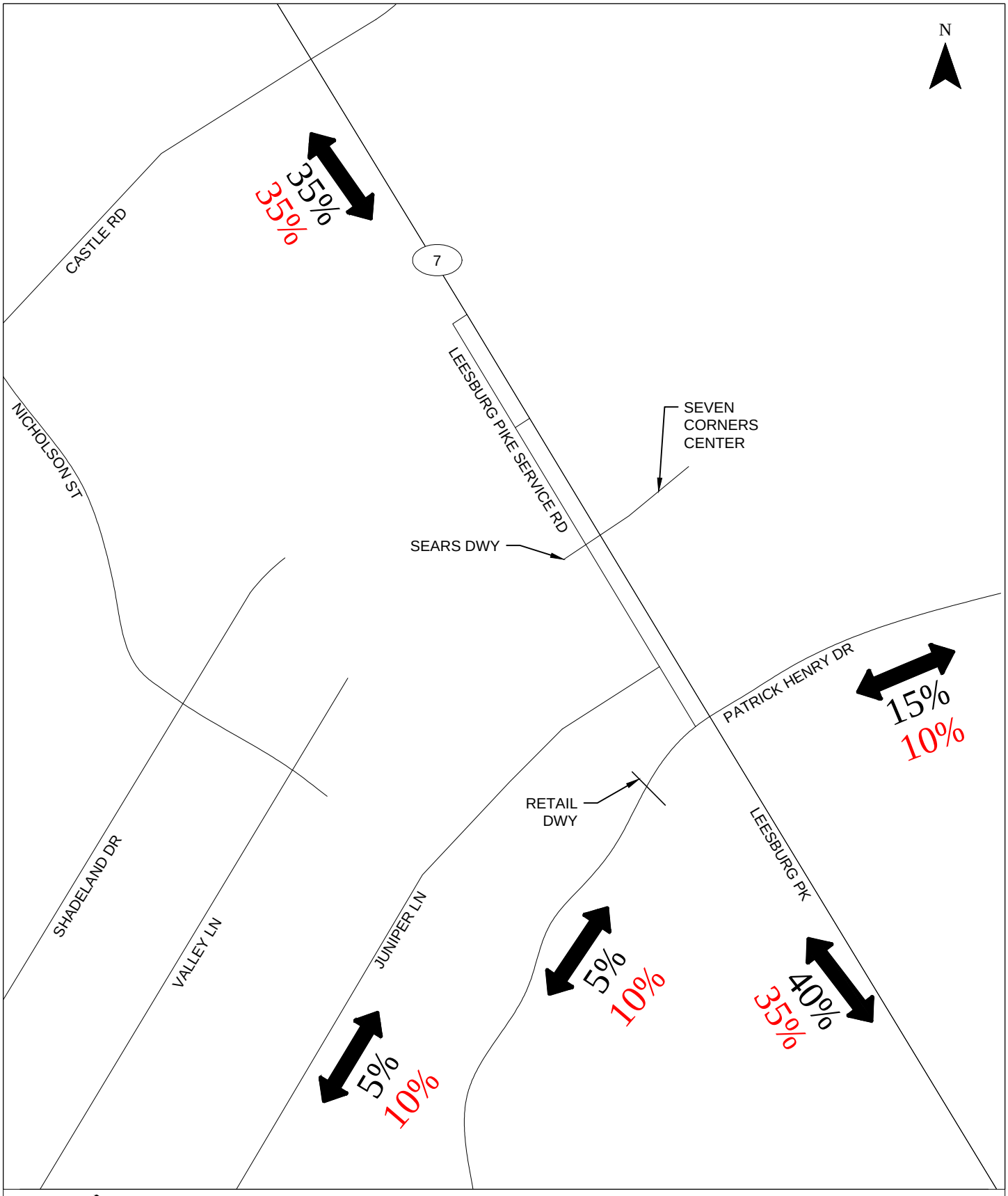
- 275 dwelling units of multifamily housing
- 25,000 S.F. of office
- 8,000 S.F. fast-casual restaurant
- 12,000 S.F. quality restaurant

- Parcel 3
  - 65 dwelling units of single-family housing

As outlined in the current Comprehensive Plan, access to Parcel 1 and Parcel 2 is assumed to direct vehicular traffic to and from Route 7. Direct access to Parcel 3 is provided on Juniper Lane, rather than Patrick Henry Drive.

Trip Distribution

Figure 19 illustrates the estimated trip distribution pattern for the Leesburg Pike Village site. The trip distribution patterns were derived from existing traffic patterns in the study area as found in the traffic counts collected as a part of this study. A slightly higher percentage of commercial traffic was assumed to come to and from the west on Juniper Lane and Patrick Henry drive due to the number of residential developments to the southwest of the study area.



XX% - Residential/Recreational Distributions

XX% - Commercial Distributions

Estimated Trip Distribution Patterns
Fairfax County, VA

Figure
19

IMPACTS OF PROPOSED DEVELOPMENT ON EXISTING ROADWAY NETWORK

The first step of evaluating future travel condition is to establish a baseline of what conditions can be expected in the future if the site develops without an updated transportation network. Traffic conditions were evaluated with the projected trips generated by the Leesburg Pike Village development when added to the existing roadway network. **Figure 20** illustrates the process for establishing projected traffic volumes under this scenario using existing traffic volumes and trip generation estimates in **Table 5**.

After removing trips related to the existing land uses on the three parcels (as they will be demolished), the pass-by and net-new trips generated by the proposed Leesburg Village Pike development are added to the existing traffic volumes to establish traffic volumes after build-out. Through discussions with FCDOT staff, no traffic growth was assumed as a part of this study as the study assesses near-term future conditions.

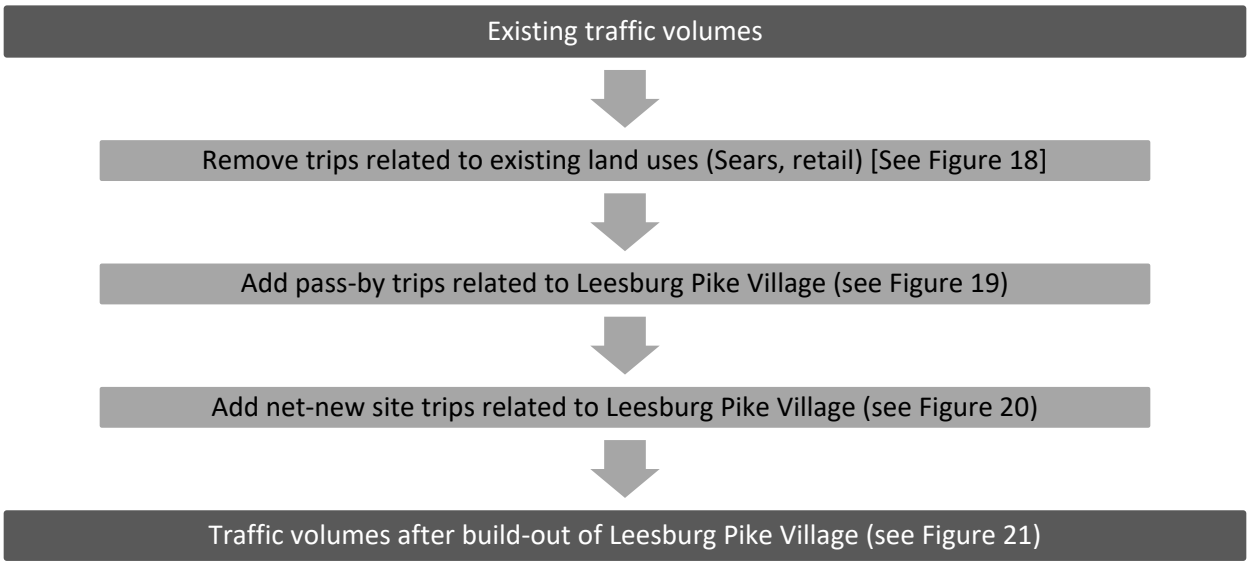
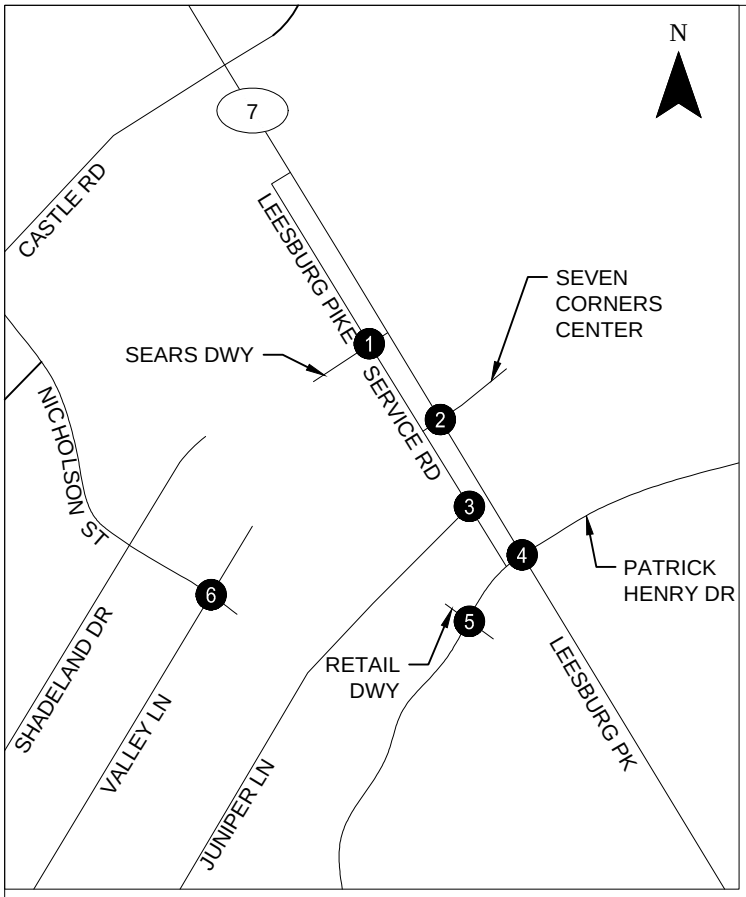
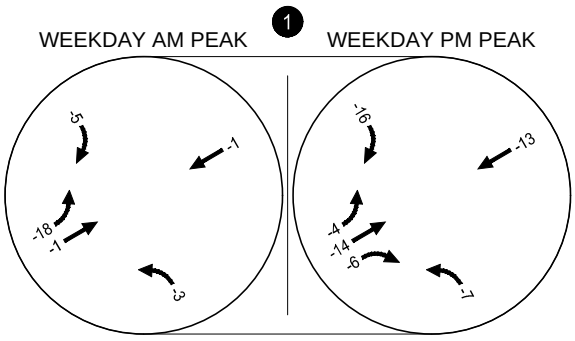


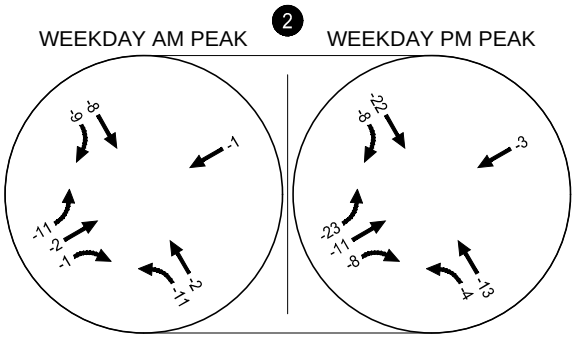
Figure 20. Process for Determining Traffic Volumes Post-Built-Out of the Leesburg Pike Village

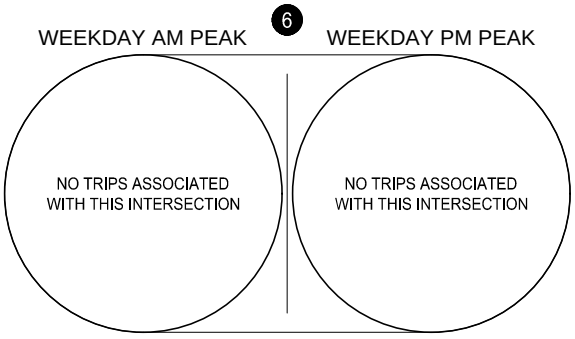
Figure 21 illustrates the trips related to the existing development removed from the roadway network. **Figure 22** and **Figure 23** show the assignment of pass-by and new-new trips, respectively, to the network according to the trip distribution shown in **Figure 19**. Pass-by trips were only assumed to come from existing trips on Route 7. These volumes were added to existing traffic volumes to arrive at the volumes shown in **Figure 24**.

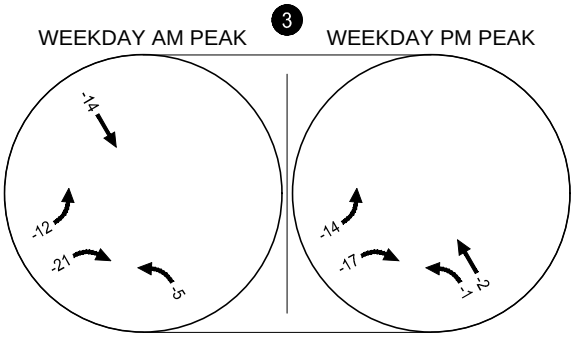
Table 5 illustrates the Synchro 10 peak hour levels of service, 95th percentile back of queue, and delay for each lane group by intersection. For this analysis, existing signal cycle lengths were left unmodified; however, individual movement splits were optimized to accommodate the updated traffic volumes. ***Appendix D*** *contains the traffic conditions operational worksheets for build-out of the site without any transportation network changes.*

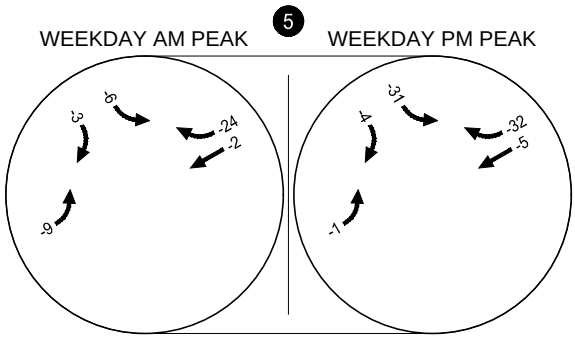


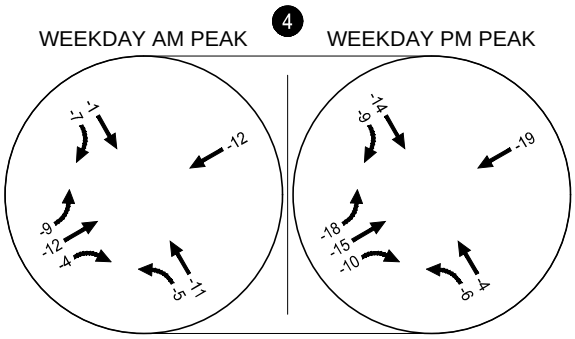






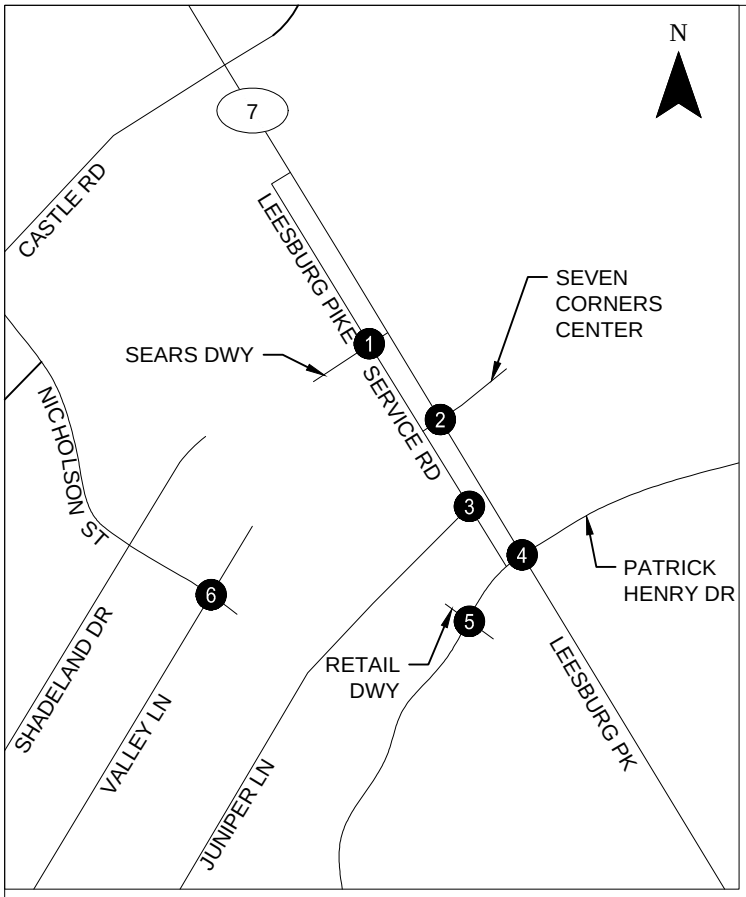


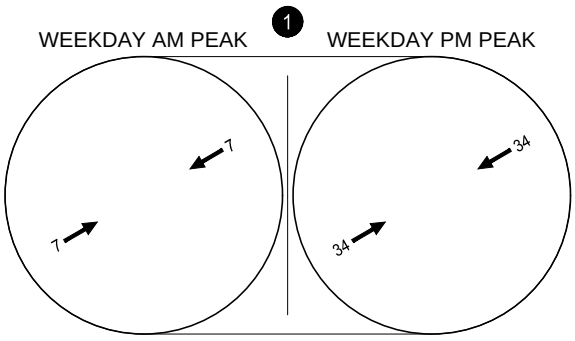


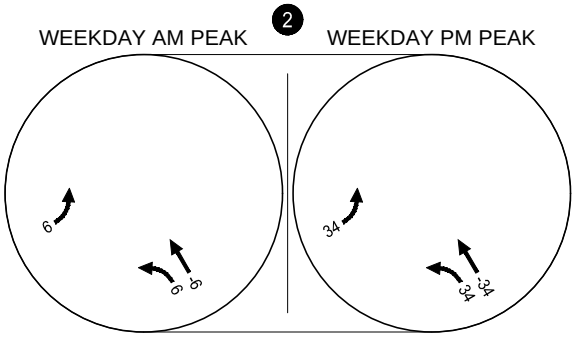


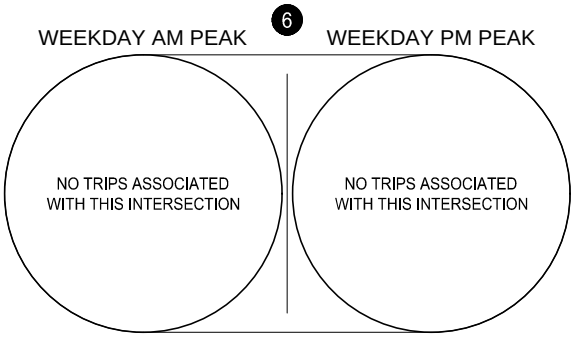
Existing Site Trips Removed from Network
Weekday AM and PM Peak Hours
Fairfax County, VA

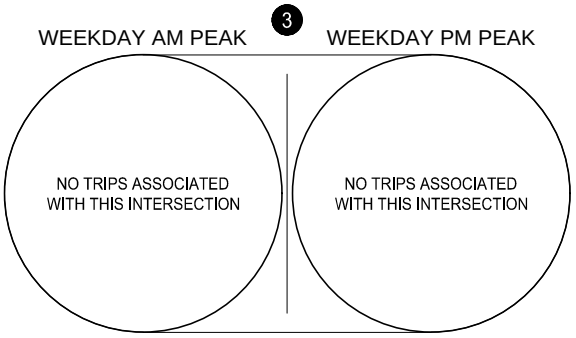
Figure
21

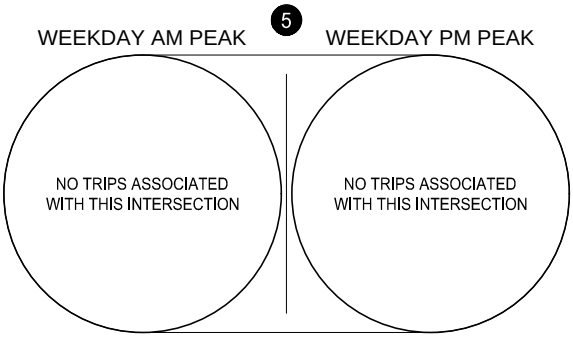


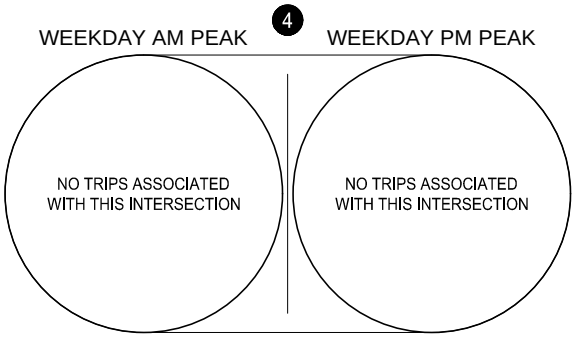






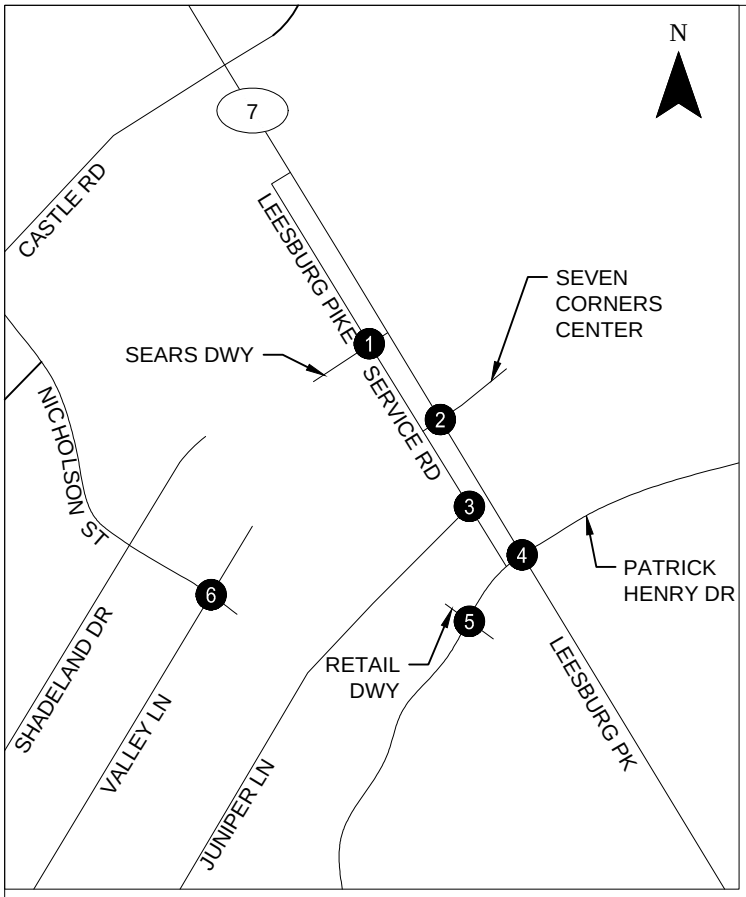


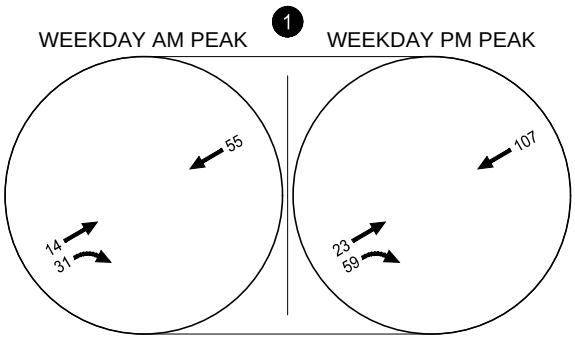


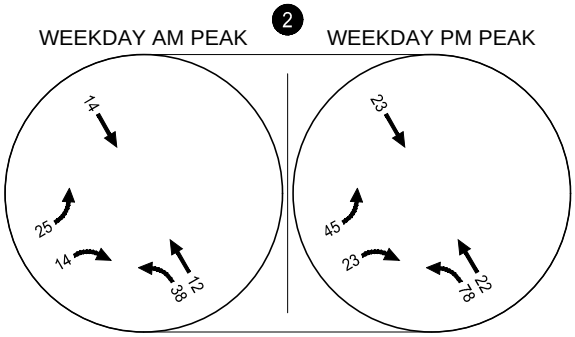


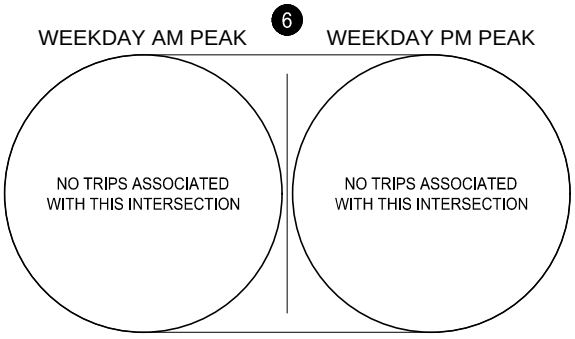
Pass-by Trips
Weekday AM and PM Peak Hours
Fairfax County, VA

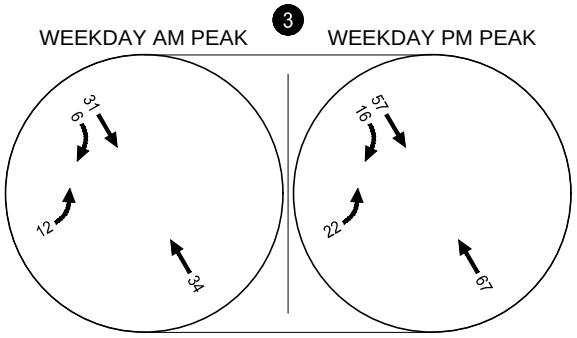
Figure
22

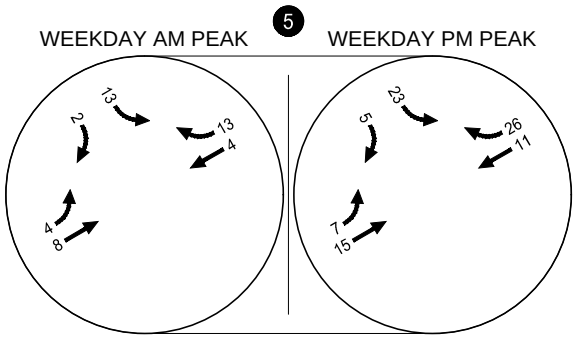


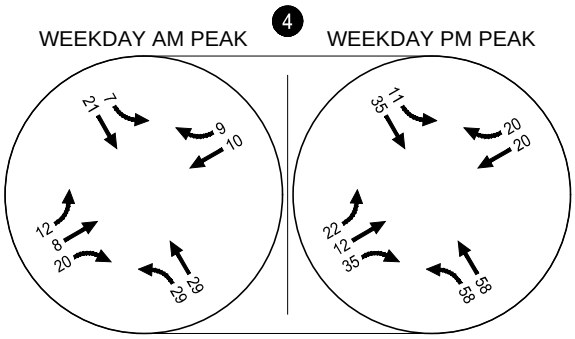






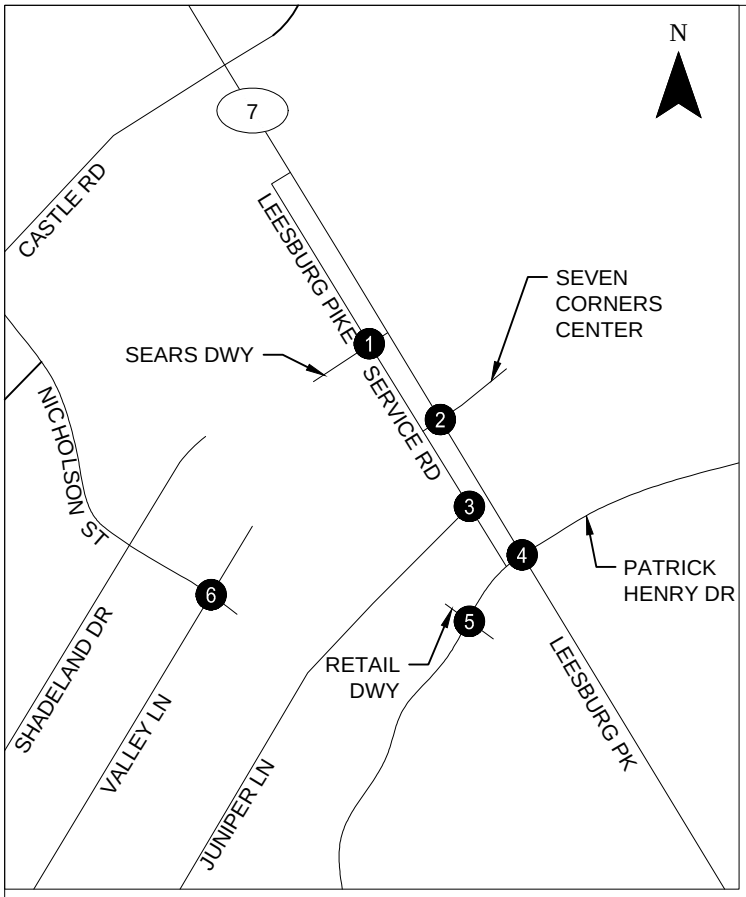


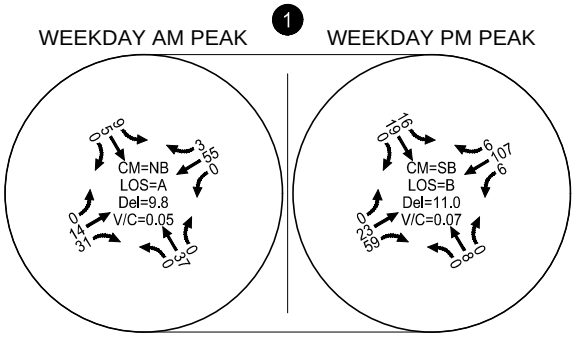


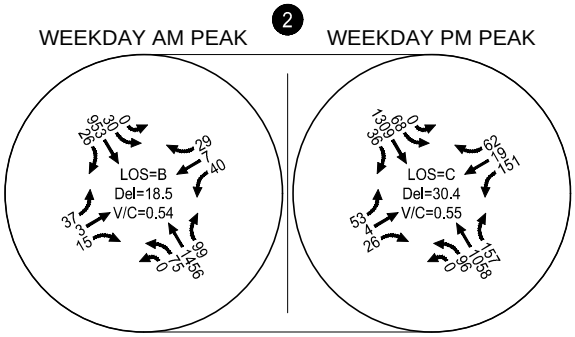


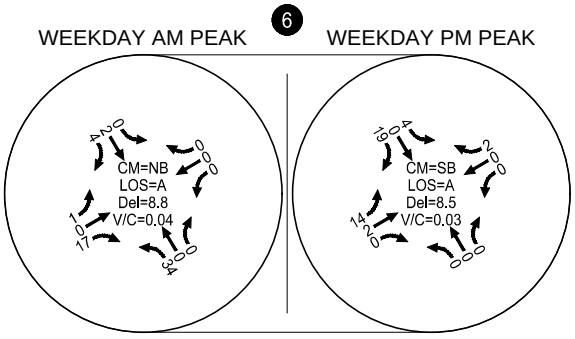
Net-New Site-Generated Trips
Weekday AM and PM Peak Hours
Fairfax County, VA

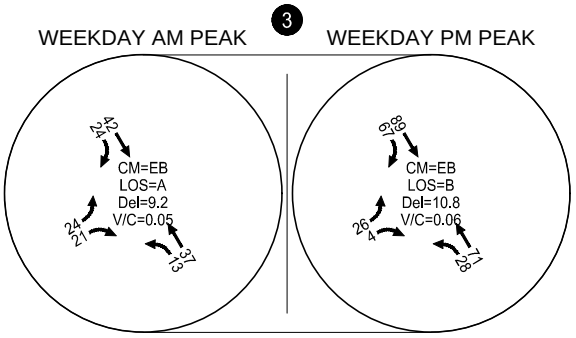
Figure
23

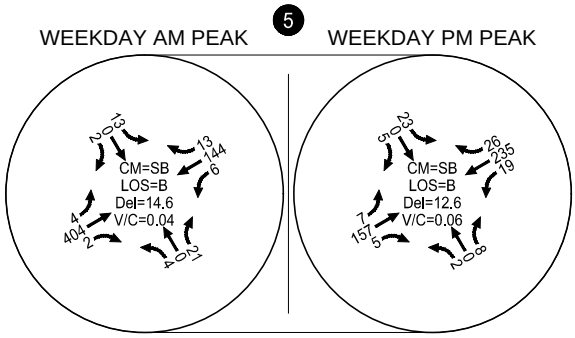


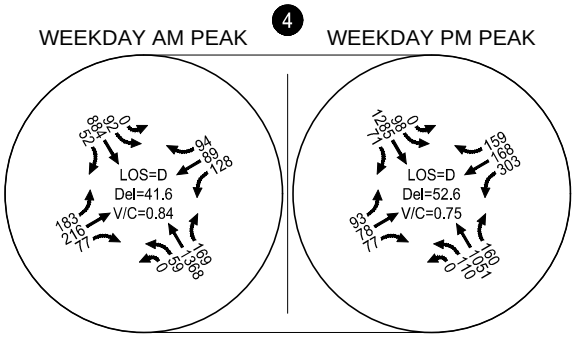












Anticiated Traffic Conditions with Proposed Development
Weekday AM and PM Peak Hours
Fairfax County, VA

Figure 24

Table 5. Traffic Conditions with Proposed Development and No Transportation Network Changes – Summary of Peak Hour Levels of Service, 95th Percentile Back of Queue, and Delay for Each Lane Group by Intersection

Intersection Information					AM Peak Hour			PM Peak Hour		
Intersection (#)	Traffic Control	Approach	Lane Group	Existing turn-lane lengths	LOS	Back of Queue (feet)	Delay (sec)	LOS	Back of Queue (feet)	Delay (sec)
Leesburg Pike/Leesburg Pike Service Road/Sears Driveway (#1)	Two-Way Stop-Controlled[1]	EB	EBLTR	-		0	0.0		0	0.0
		EB Approach					0.0			0.0
		WB	WBLTR	-		0	0.0	A	0	0.4
		WB Approach					0.0			0.4
		NB	NBLTR	-	A	4	9.8	B	1	10.6
		NB Approach			A		9.8	B		10.6
		SB	SBLTR	-	A	1	9.7	B	6	11.0
		SB Approach			A		9.7	B		11.0
Leesburg Pike/Leesburg Pike Service Road/Seven Corners Center (#2)	Signalized	EB	EBLTR	-	A	m8	6.1	A	m10	3.5
		EB Approach			A		6.1	A		3.5
		WB	WBL	150	E	64	77.3	F	#189	95.3
			WBLT	-	E	65	77.3	F	#191	94.6
			WBR	105	E	0	73.4	E	0	69.5
		WB Approach			E		75.8	F		88.1
		NB	NBL	175	A	m18	6.3	D	m75	50.2
			NBT	-	A	275	9.3	B	107	10.4
			NBR	320	C	m0	21.7	A	m0	0.3
		NB Approach			A		10.0	B		12.1
		SB	SBL	570	C	40	23.5	C	81	26.7
			SBT	-	C	377	29.0	D	568	40.4
			SBR	165	C	44	23.0	C	60	29.5
		SB Approach			C		28.7	D		39.5
		Overall Intersection			B		18.5	C		30.4
Leesburg Pike Service Road/ Juniper Lane (#3)	Two-Way Stop-Controlled	EB	EBLR	-	A	4	9.2	B	5	10.8
		EB Approach			A		9.2	B		10.8
		NB	NBLR	-	A	1	2.0	A	2	2.3
		NB Approach					2.0			2.3
		SB	SBLR	-		0	0.0		0	0.0
		SB Approach					0.0			0.0
Leesburg Pike/ Patrick Henry Drive (#4)	Signalized	EB	EBL	100	A	m17	5.1	B	0	11.9
			EBTR	-	A	m28	7.4	B	1	12.1
		EB Approach			A		6.5	B		12.0
		WB	WBR	260	F	#249	113.0	F	5	113.6
			WBTR	-	F	#256	114.7	F	#256	111.8
			WBR	260	E	85	64.9	E	85	57.0
		WB Approach			F		99.1	F		98.7
		NB	NBL	380	C	64	29.2	E	64	67.9
			NBTR	545	E	659	55.1	E	659	56.0
		NB Approach			D		54.1	E		57.0
		SB	SBL	215	F	#156	81.4	E	#156	79.2
			SBT	-	B	67	15.2	C	67	32.8
			SBR	140	B	18	12.7	C	18	26.8
		SB Approach			C		21.0	D		35.6
		Overall Intersection			D		41.6	E		52.6

Intersection Information					AM Peak Hour			PM Peak Hour		
Intersection (#)	Traffic Control	Approach	Lane Group	Existing turn-lane lengths	LOS	Back of Queue (feet)	Delay (sec)	LOS	Back of Queue (feet)	Delay (sec)
Patrick Henry Drive/Retail Driveway/Apartment Driveway (#5)	Two-Way Stop-Controlled	EB	EBLTR	-	A	0	0.1	A	0	0.4
		EB Approach					0.1			0.4
		WB	WBLTR	-	A	0	0.4	A	1	0.6
		WB Approach					0.4			0.6
		NB	NBLTR	-	B	4	11.7	A	1	9.9
		NB Approach			B		11.7	A		9.9
		SB	SBLTR	-	B	3	14.6	B	5	12.6
		SB Approach			B		14.6	B		12.6
Valley Lane/ Nicholson Street (#6)	Two-Way Stop-Controlled	EB	EBLTR	-	A	0	0.4	A	1	6.3
		EB Approach					0.4			6.3
		WB	WBLTR	-		0	0.0		0	0.0
		WB Approach					0.0			0.0
		NB	NBLTR	-	A	3	8.8	A	0	0.0
		NB Approach			A		8.8	A		0.0
		SB	SBLTR	-	A	0	8.6	A	2	8.5
		SB Approach			A		8.6	A		8.5

[1]Intersection currently features three stop-controlled approaches and a single uncontrolled approach. As this configuration is not permitted in HCM analysis, the Sears driveway approach was modeled as uncontrolled. Analysis provides approximate operational conditions.

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

95th percentile volume exceeds capacity, queue may be longer.

As shown in the figures and **Table 5**, all study intersections are forecast to continue to operate at the same LOS relative to existing conditions with the following exceptions:

- **Leesburg Pike/Patrick Henry Drive**: The signalized intersection is forecast to operate below capacity at LOS E during the weekday p.m. peak hour with the added site trips. The intersection currently operates at LOS D during the weekday p.m. peak hour. The redevelopment of the site is anticipated to increase volumes for several movements, and most notably, northbound left-turn volumes nearly double relative to existing conditions.

- **Leesburg Pike/Leesburg Pike Service Road/Seven Corners Center:** The overall LOS for the signalized intersection is forecast to continue to operate at a LOS B during the AM peak and LOS C during the PM peak. The westbound approach remains problematic and is forecast to operate at LOS F during the PM peak and continue to operate at LOS E during the AM peak. Westbound-thru and left movements are forecast to experience the highest delay.

EVALUATION OF PROPOSED OPTIONS

Prior to the onset of this study, FCDOT worked with community groups to develop eight alternatives for evaluation. These options were shown in **Figure 6** in the Introduction section. As this is a planning-level study, several assumptions were made regarding the proposed options.

Assumptions

The following sections highlight several assumptions made to all options, as well as, option-specific assumptions.

Note: *This study does not suggest or proposed specific driveway access configurations. Reasonable assumptions were made based on access management principles and engineering judgement. Access points will need to be proposed and justified to FCDOT by the private developer who ultimately redevelops the site.*

Universal Assumptions

Several elements of the graphical renderings of the options provided by FCDOT at the beginning of the study were modified based on engineering judgement, as shown in **Figure 25** and detailed below:

- **Location of Route 7 signal north of Patrick Henry Drive:** Each of the eight original concept renderings show a proposed traffic signal at the northernmost driveway of the existing Sears site (i.e., the top of Parcel 1). Shifting the existing signal serving the Seven Corners Center and Sears sites north to this location would both impact the traffic circulation within the Seven Corners Center site and place the signal in close proximity to the proposed "Spine Road" outlined in the County's Comprehensive Plan. As such, this signal was assumed to remain at its existing location. This will limit impacts to the Seven Corners Center site and provide for more equitable signal spacing between the signal system between Spine Road and Patrick Henry Drive on Route 7.

- **Location of roadway between Parcel 1 and Parcel 2**: Each of the eight original concept renderings show a proposed roadway between Parcel 1 and Parcel 2 intersecting with Route 7 south of the Seven Corners Center driveway. With respect to the above assumption regarding signal location, this roadway was assumed to align with the existing Seven Corners Center driveway. This will provide the Leesburg Pike Village site with a signalized access point and improve spacing from the downstream Route 7/Patrick Henry Drive intersection.

(A) Original **(B) Assumed**

Figure 25. Study Area Configuration for Original 8 Concepts (A) and Assumed Changes to Signal and Road Configurations (B)

This results in the revised eight options shown in **Figure 26**. ***Appendix E*** *contains the assumed lane configurations under each of the options.*

Figure 26. Revised Renderings of Eight Options Based on Study Assumptions

Option-Specific Assumptions

Several assumptions were also made regarding access and trip assignment for each individual option.

- **Parcel 3 Access**: For options proposing to close both Juniper Lane and Leesburg Pike Service Road along the frontage of Parcel 3 and without a proposed connection between Juniper Lane and Patrick Henry Drive (Options 2, 3, 6, and 8), access to Parcel 3 was assumed to be along Patrick Henry Drive. For all other options, access to Parcel 3 was assumed to be provided on Juniper Lane or the proposed Juniper Lane-Patrick Henry Drive connection.

- **Trips Accessing Parcels 1 & 2 From Locations to the South:** For options with a proposed connection between Patrick Henry Drive and Juniper Lane (Options 1, 4, and 5), 10 percent of the site-generated trips coming from Route 7 south of the site were assumed to divert to Patrick Henry and access the Parcel 1 and Parcel 2 via the new proposed connection. The remaining 90 percent were assumed to continue north on Route 7 and access Parcel 1 and Parcel 2 by making a left-turn into the site at the Route 7/Seven Corners Center/Site Access Road B intersection.

Trip Assignment for Options

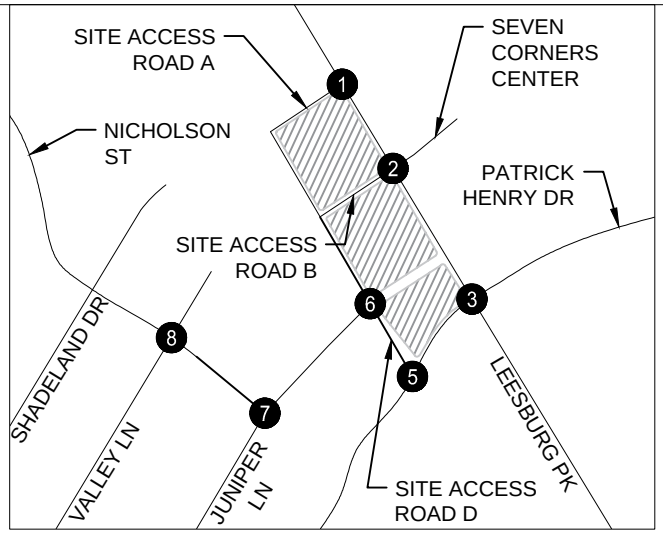
Following a similar process to that shown in **Figure 20**, traffic volumes were developed for each option by removing existing site trips, rerouting remaining traffic based on updated roadway connections, adding pass-by trips, and finally adding site-generated trips to the roadway network. Existing site trips and pass-by trips for all options are assumed to be the same as shown in **Figure 21** and **Figure 22**, respectively. ***Appendix F*** *contains the rerouted existing trips based on the proposed roadway configuration under each option.* ***Appendix G*** *contains the assignment of net-new site-generated trips for each of the options.*

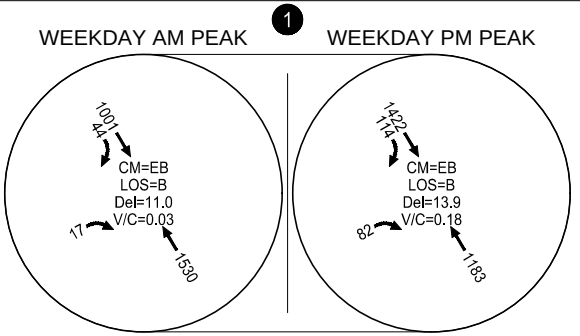
Traffic Operations under Each Option

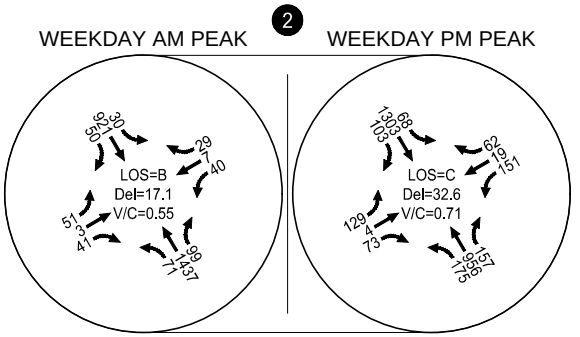
Figure 27 through **Figure 34** illustrate the projected traffic volumes and operations under Option 1 through Option 8, respectively. **Table 6** illustrates the Synchro 10 peak hour levels of service, 95th percentile back of queue, and delay for each lane group by intersection. For this analysis, existing signal cycle lengths were left unmodified; however, individual movement splits were optimized to accommodate the updated traffic volumes. ***Appendix H*** *contains the traffic conditions operational worksheets for each of the eight options.*

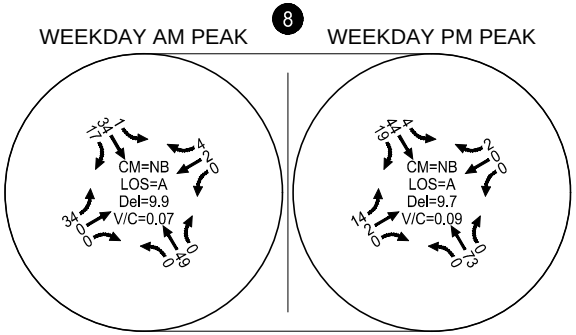
Note*: As several intersections have either shifted or been removed completely from the roadway network, the intersection numbers have been reassigned in the associated figures and tables for simplicity and clarity.*

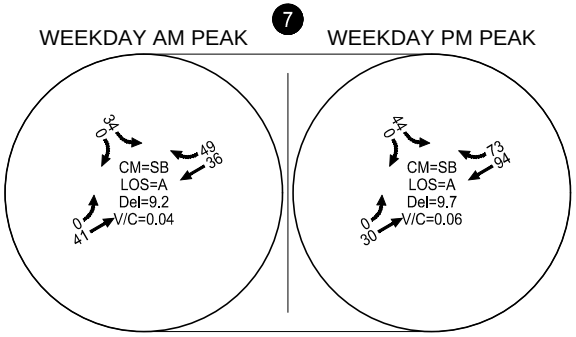
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

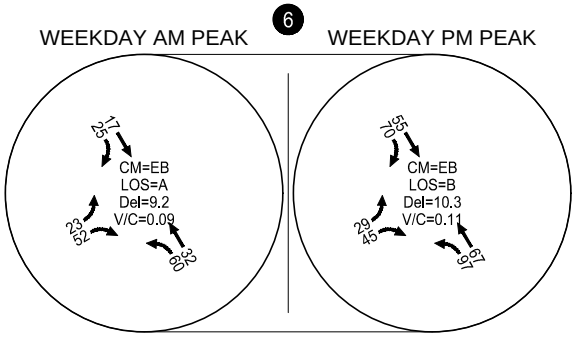


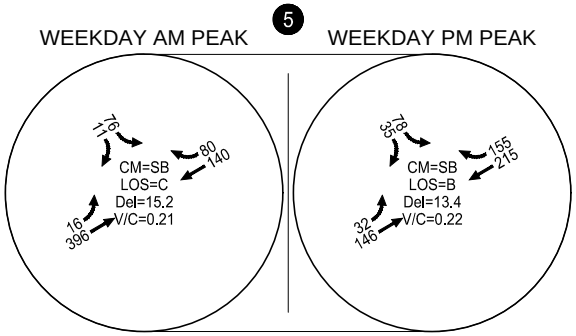


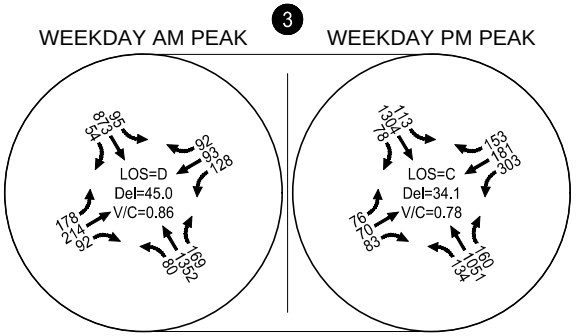








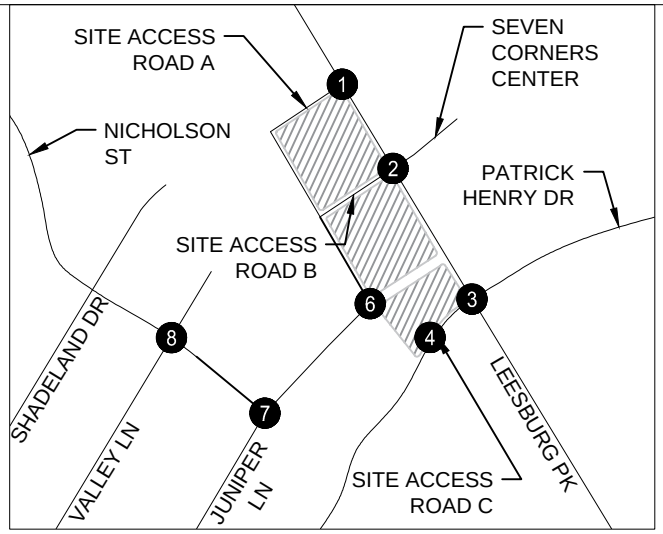


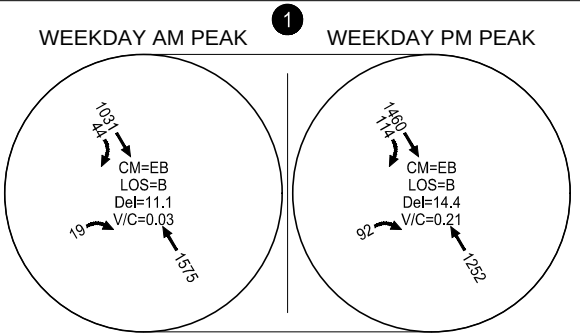


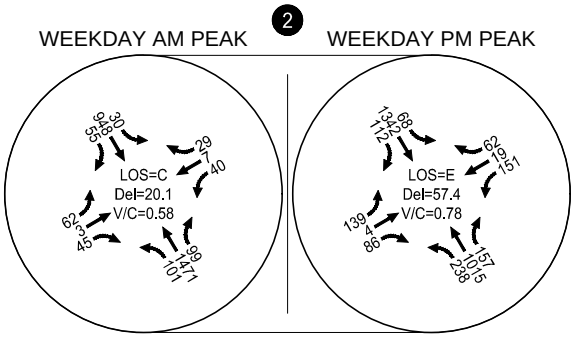
Anticipated Traffic Conditions: Option 1
Weekday AM and PM Peak Hours
Fairfax County, VA

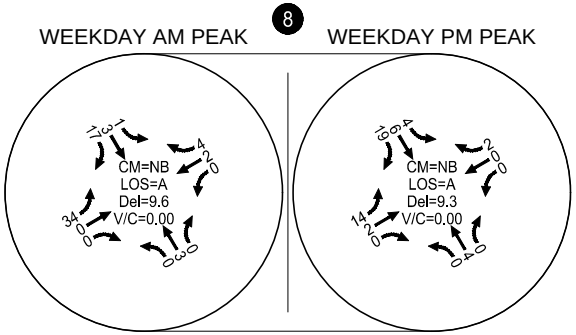
Figure 27

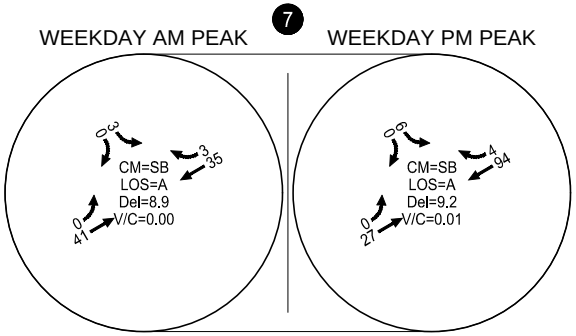
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

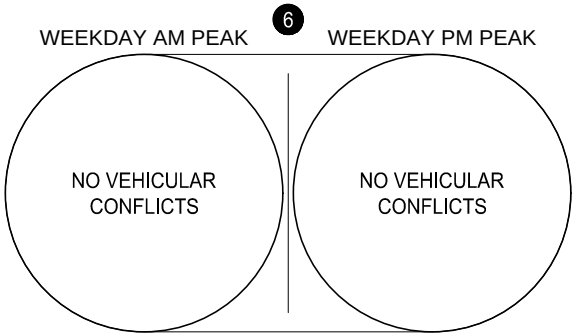


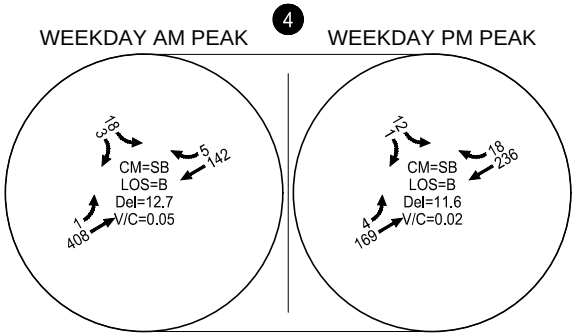


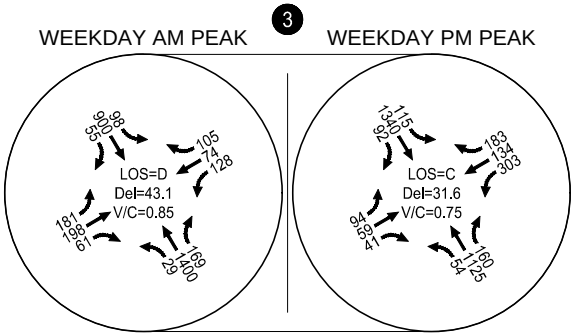








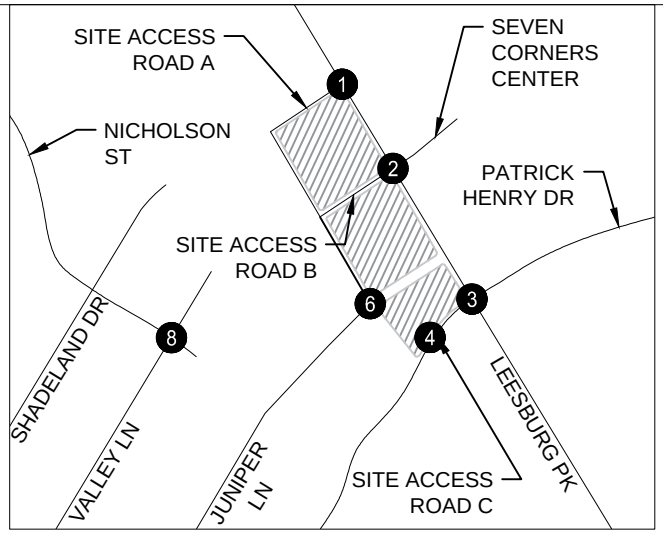


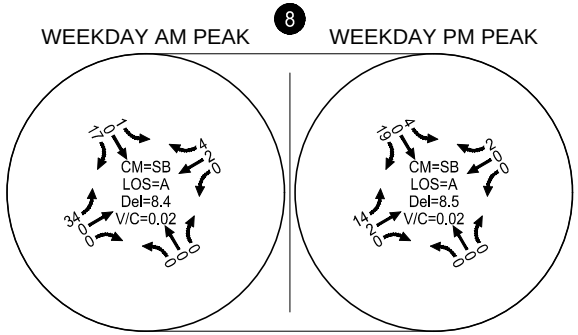


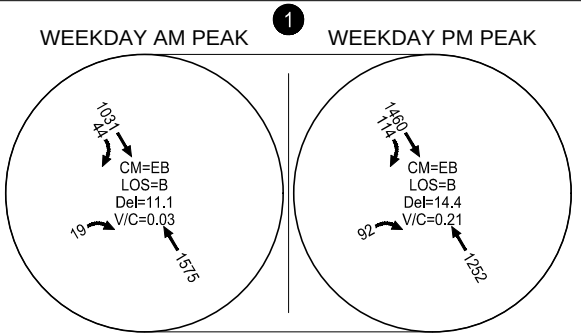
Anticipated Traffic Conditions: Option 2
Weekday AM and PM Peak Hours
Fairfax County, VA

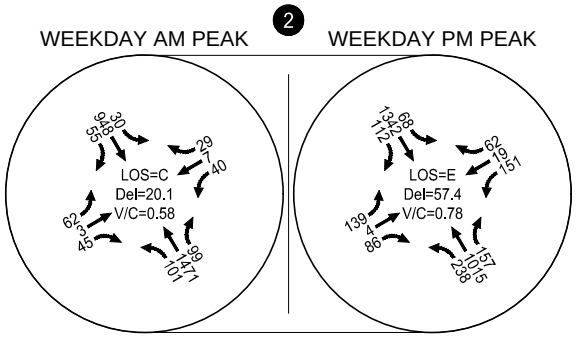
Figure 28

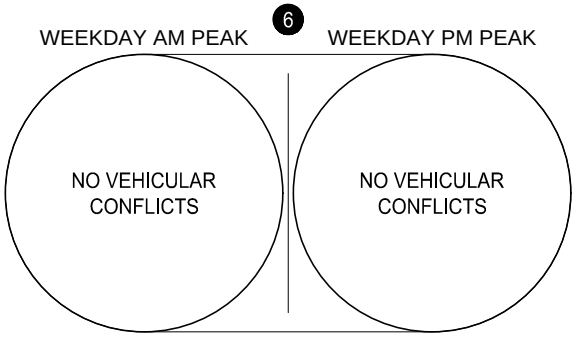
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

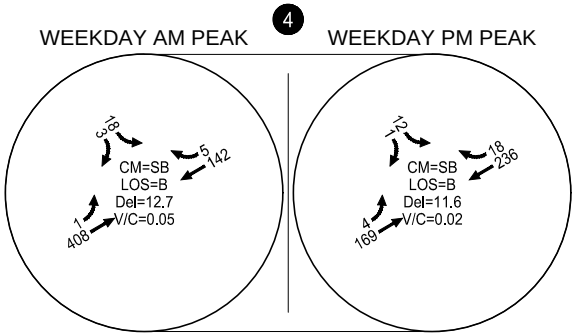


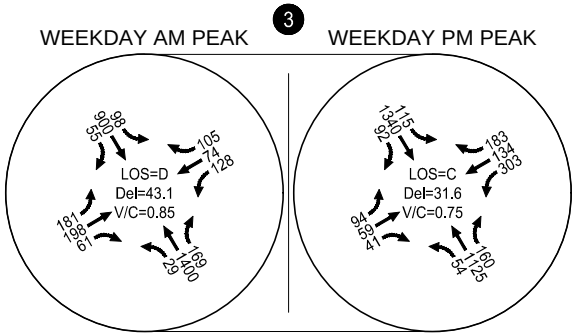








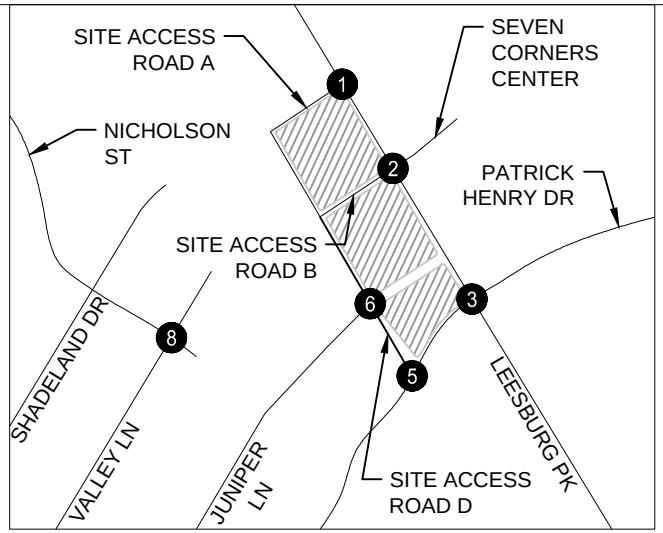


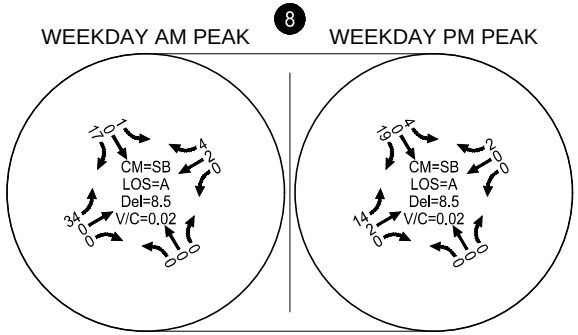


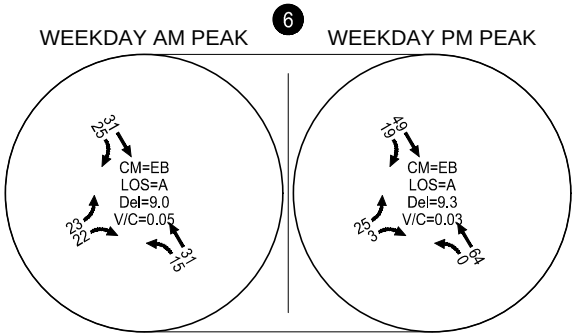
Anticipated Traffic Conditions: Option 3
Weekday AM and PM Peak Hours
Fairfax County, VA

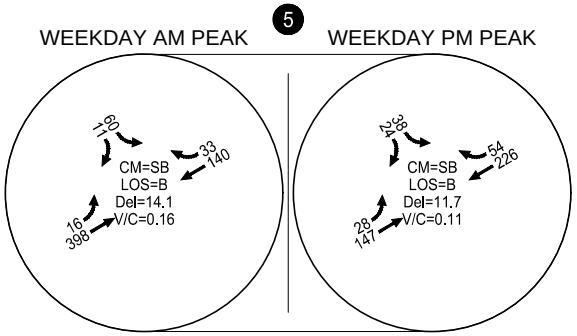
Figure 29

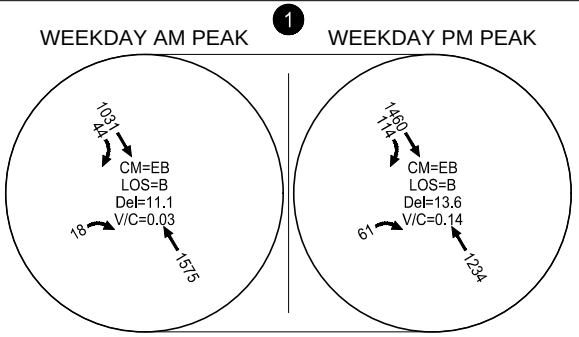
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

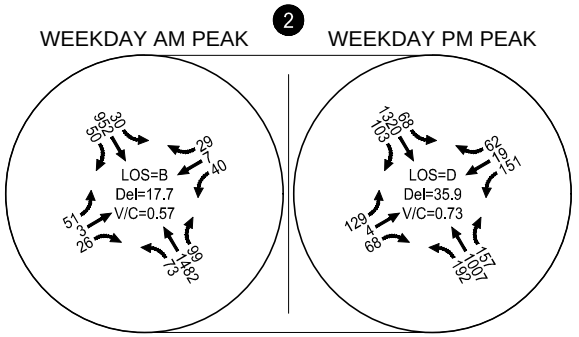


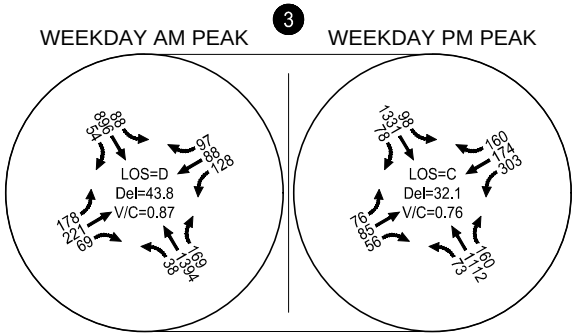












Anticipated Traffic Conditions: Option 4
Weekday AM and PM Peak Hours
Fairfax County, VA

Figure 30

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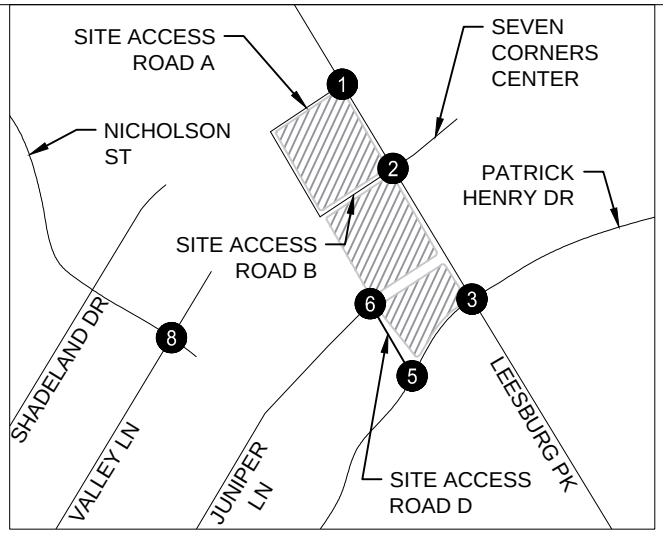
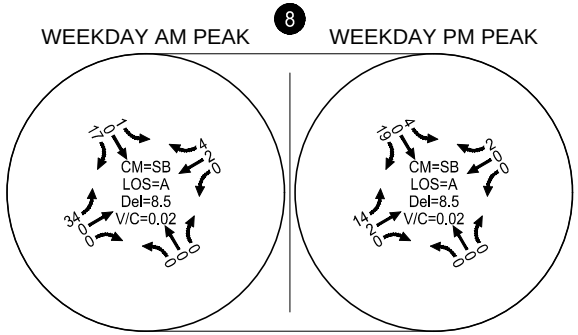
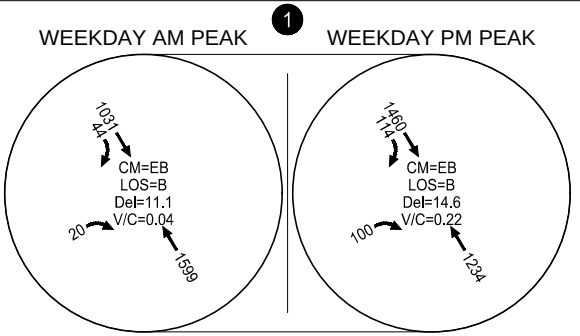
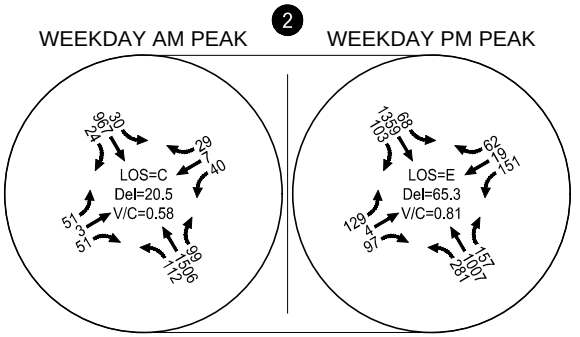
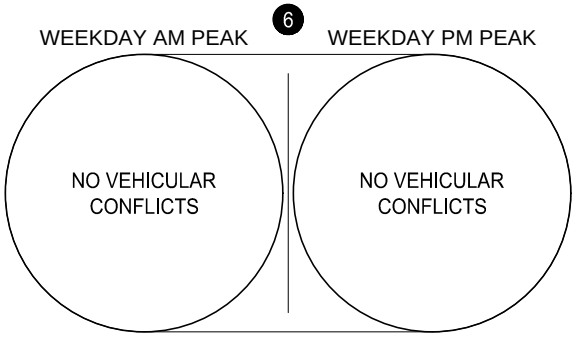
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

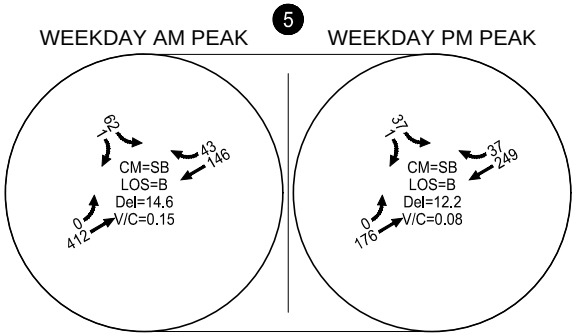


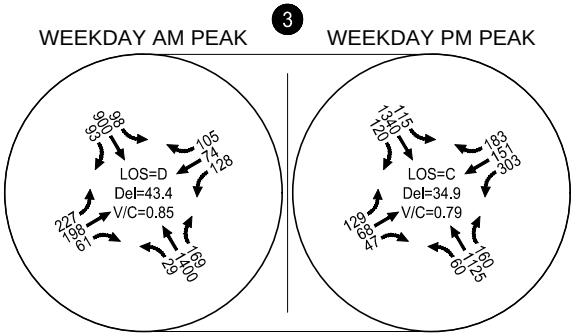












Anticipated Traffic Conditions: Option 5
Weekday AM and PM Peak Hours
Fairfax County, VA

Figure 31

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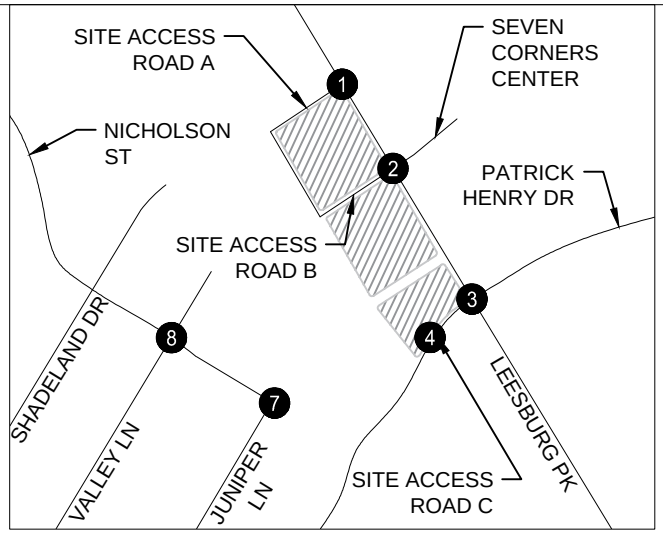
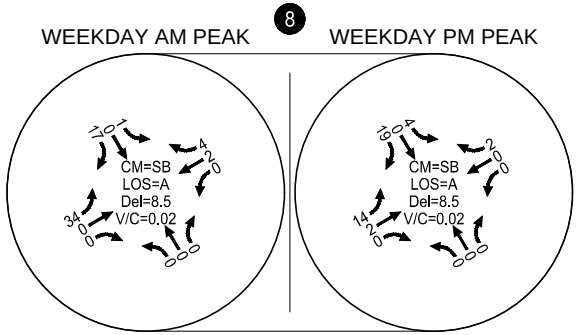
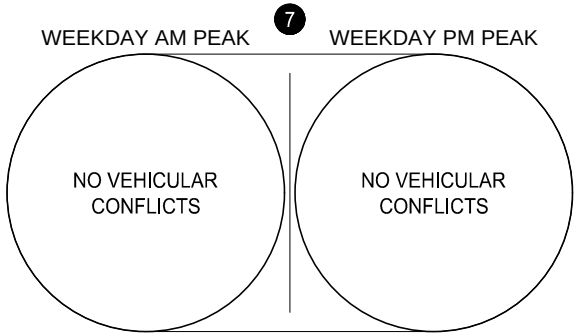
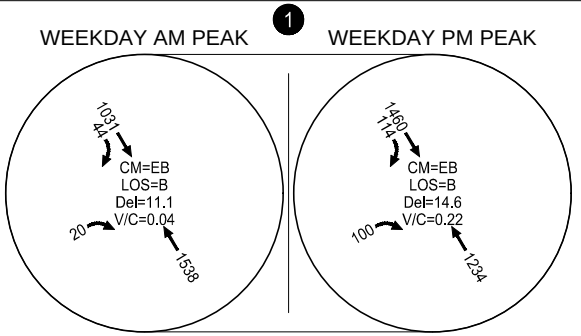
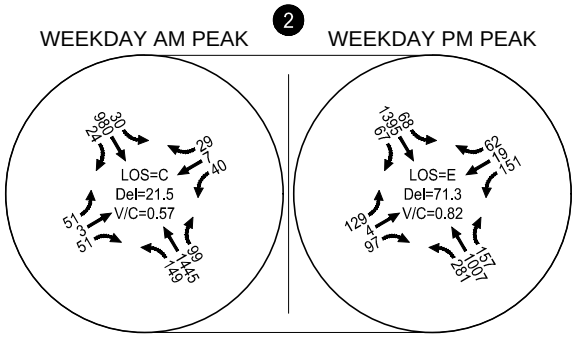
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

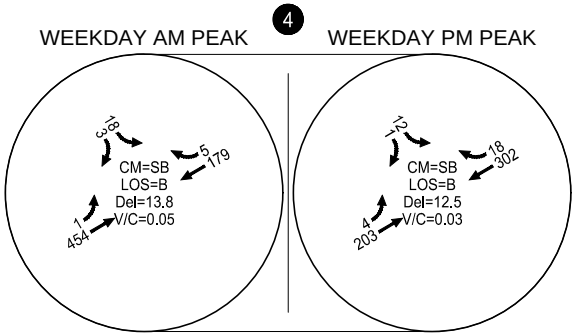


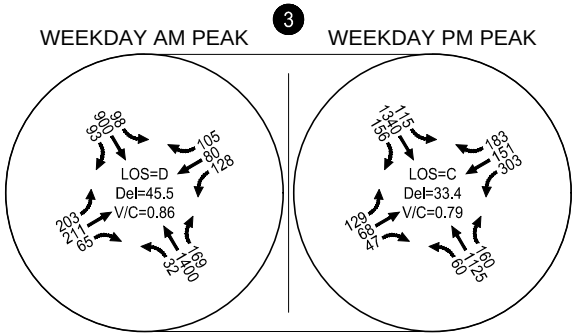








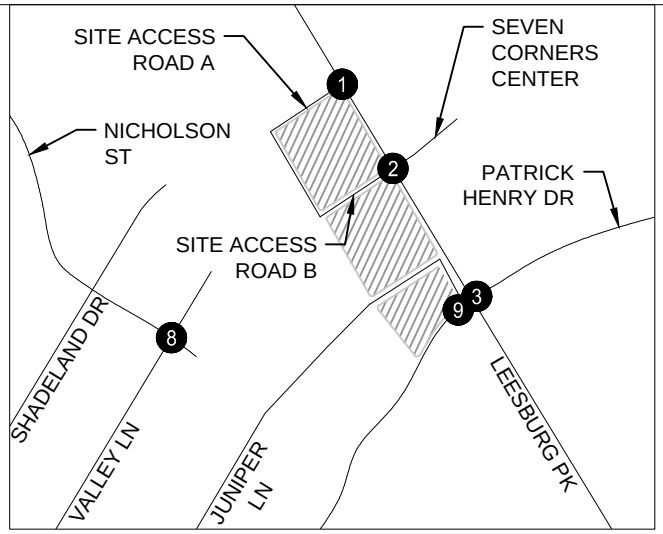


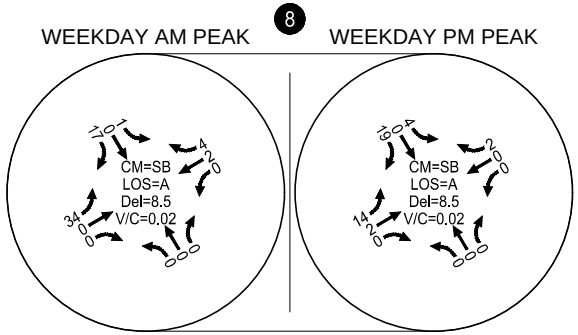


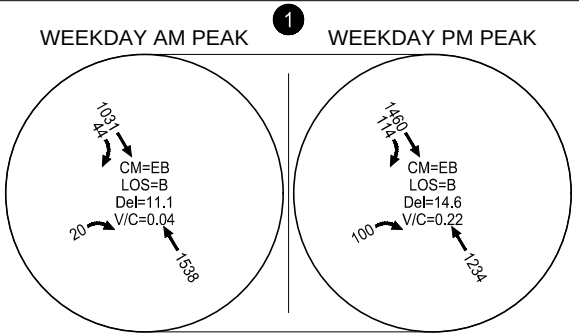
Anticipated Traffic Conditions: Option 6
Weekday AM and PM Peak Hours
Fairfax County, VA

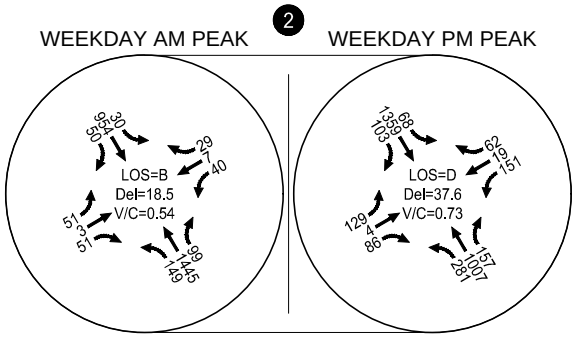
Figure 32

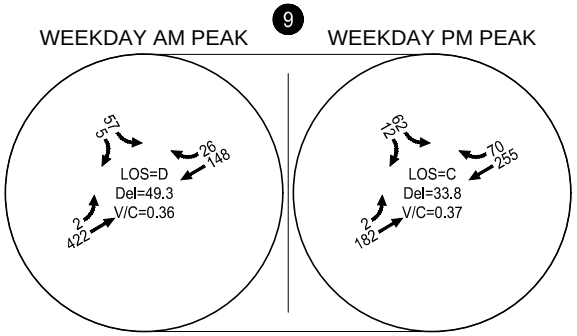
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

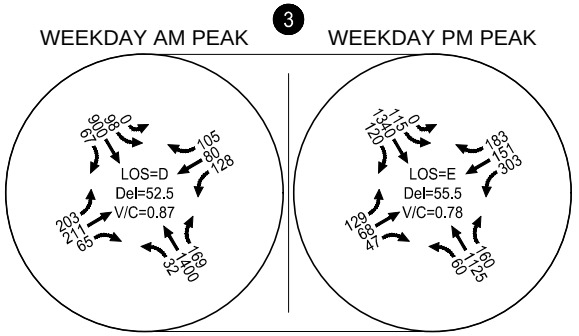








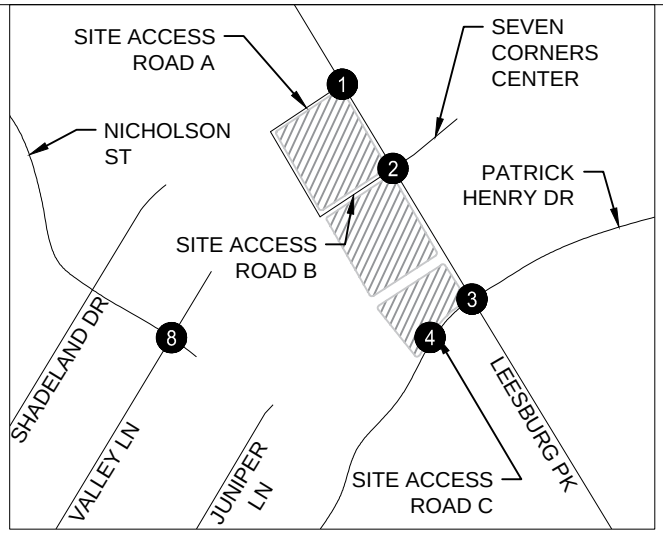


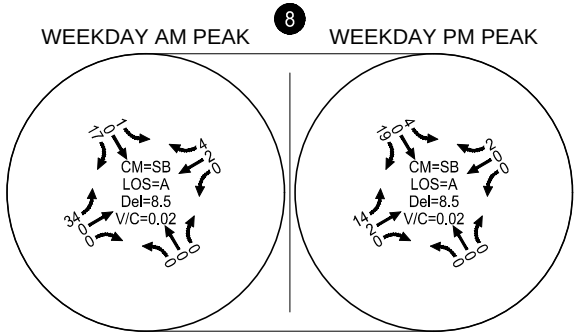


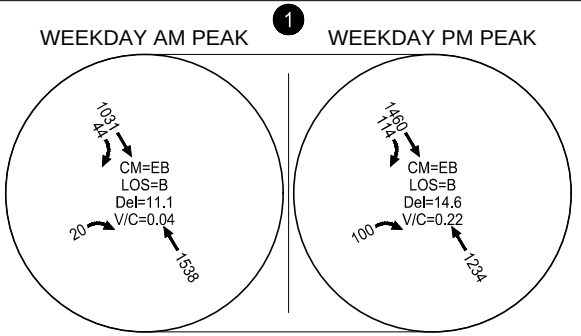
Anticipated Traffic Conditions: Option 7
Weekday AM and PM Peak Hours
Fairfax County, VA

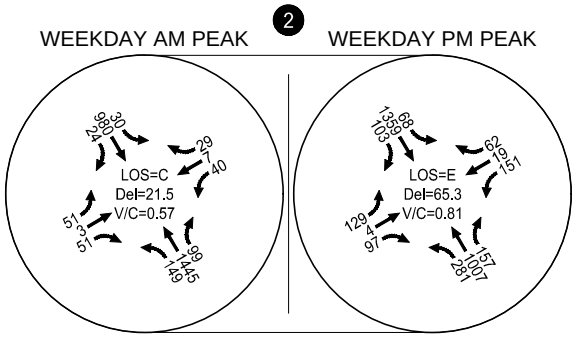
Figure
33

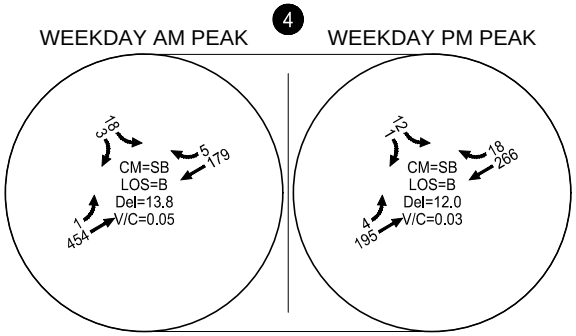
CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = CRITICAL MOVEMENT LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL CRITICAL VOLUME-TO-CAPACITY RATIO

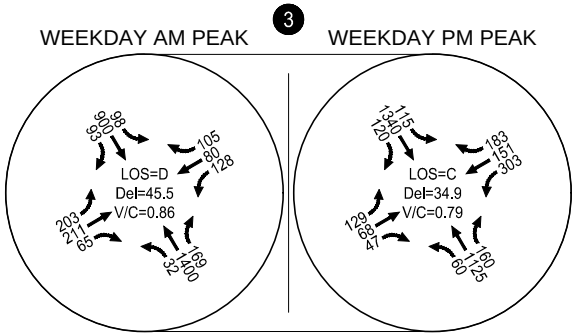












Anticipated Traffic Conditions: Option 8
Weekday AM and PM Peak Hours
Fairfax County, VA

Figure 34

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Table 6. Anticipated Traffic Conditions – Option 1 through Option 8 – Overall Intersection Delay and Level of Service

Intersection Information			Option 1				Option 2				Option 3				Option 4				Option 5				Option 6				Option 7				Option 8			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Intersection	Traffic Control	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Route 7 (Leesburg Pike) & Seven Corners Center/ Site Access Road A	Unsignalized	11.0	B	13.9	B	11.1	B	14.4	B	11.1	B	14.4	B	11.1	B	13.6	B	11.1	B	14.6	B	11.1	B	14.6	B	11.1	B	14.6	B	11.1	B	14.6	B
2	Route 7 (Leesburg Pike) & Seven Corners Center/ Site Access Road B	Signalized	17.1	B	32.6	C	20.1	C	57.4	E	20.1	C	57.4	E	17.7	B	35.9	D	20.5	C	65.3	E	21.5	C	71.3	E	18.5	B	37.6	D	21.5	C	65.3	E
3	Route 7 (Leesburg Pike) & Patrick Henry Dr	Signalized	45.0	D	34.1	C	43.1	D	31.6	C	43.1	D	31.6	C	43.8	D	32.1	C	43.4	D	34.9	C	45.5	D	33.4	C	52.5	D	55.5	E	45.5	D	34.9	C
4	Patrick Henry Dr & Site Access Road C	Unsignalized	-	-	-	-	12.7	B	11.6	B	12.7	B	11.6	B	-	-	-	-	-	-	-	-	13.8	B	12.5	B	-	-	-	-	13.8	B	12.0	B
5	Patrick Henry Dr & Site Access Road D	Unsignalized	15.2	C	13.4	B	-	-	-	-	-	-	-	-	14.1	B	11.7	B	14.6	B	12.2	B	-	-	-	-	-	-	-	-	-	-	-	-
6	Site Access Road D & Juniper Ln	Unsignalized	9.2	A	10.3	B	-	-	-	-	-	-	-	-	9.0	A	9.3	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Juniper Ln & Nicholson St	Unsignalized	9.2	A	9.7	A	8.9	A	9.2	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Nicholson St & Valley Ln	Unsignalized	9.5	A	9.3	A	8.6	A	8.7	A	8.4	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A	8.5	A
9	Patrick Henry Dr & Service Road	Signalized	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49.3	D	33.8	C	-	-	-	-

"-" indicates the intersection is either not applicable to the particular Option or does not experience vehicular conflicts under the Option

As shown, the traffic operations under each option is forecast to operate at similar levels of service relative to existing conditions and to each other with the following exceptions:

- **Route 7/Seven Corners Center/Site Access Road B**: The signalized access to Parcel 1 and Parcel 2 is anticipated to operate at LOS C and LOS D during the weekday p.m. peak hour under Options 1 and Options 4/7, respectively. Under all other options, the intersection is forecast to operate at LOS E with approximately 20 to 30 seconds additional overall intersection delay. The anticipated reduction in delay in Options 1, 4, and 7 likely stems from the additional roadway connections to Parcel 1 and Parcel 2 under these options, which act as a release valve for the trips generated by these parcels. Under the other options, site-generated trips from Parcel 1 and Parcel 2 are forced to enter/exit via one of the two entrances on Route 7.

- **Route 7/Patrick Henry Drive**: The signalized intersection is anticipated to operate at LOS E during the weekday p.m. peak hour under Option 7, relative to LOS C or D under all other options. The additional delay under Option 7 results from retaining the Leesburg Pike Service Road connection on Patrick Henry Drive intersection. Due to its proximity to the Route 7/Patrick Henry Road intersection, movements from the service road are tied to the same signal controller equipment as the Route 7/Patrick Henry Drive intersection. The additional movements added to the signal increase the amount of lost time in each cycle and decreases the amount of available green time for heavy movements. In options where the Leesburg Pike Service Road is disconnected from Patrick Henry, the Route 7/Patrick Henry Drive signal is forecast to operate more efficiently.

Cut-Through Trips on Juniper Lane

As part of the trip assignment for each option, the number of projected cut-through trips on Juniper Lane was evaluated against Fairfax County's Cut-Through Restrictions established in the Residential Traffic Administration Program (RTAP). The restrictions provide guidance on accessing the appropriateness of access restrictions to residential neighborhood streets based on various roadway characteristics and the number of cut-through trips through the neighborhood. To qualify, a particular roadway must:

- Be a local or collector roadway with a posted speed of 25 miles-per-hour;

- Must have at least 150 peak-hour cut-through trips in one direction that accounts for more than 40 percent of the peak hour traffic; and,

- Contain 12 dwellings or more per 1,000 feet of roadway without access restrictions (collectors only)

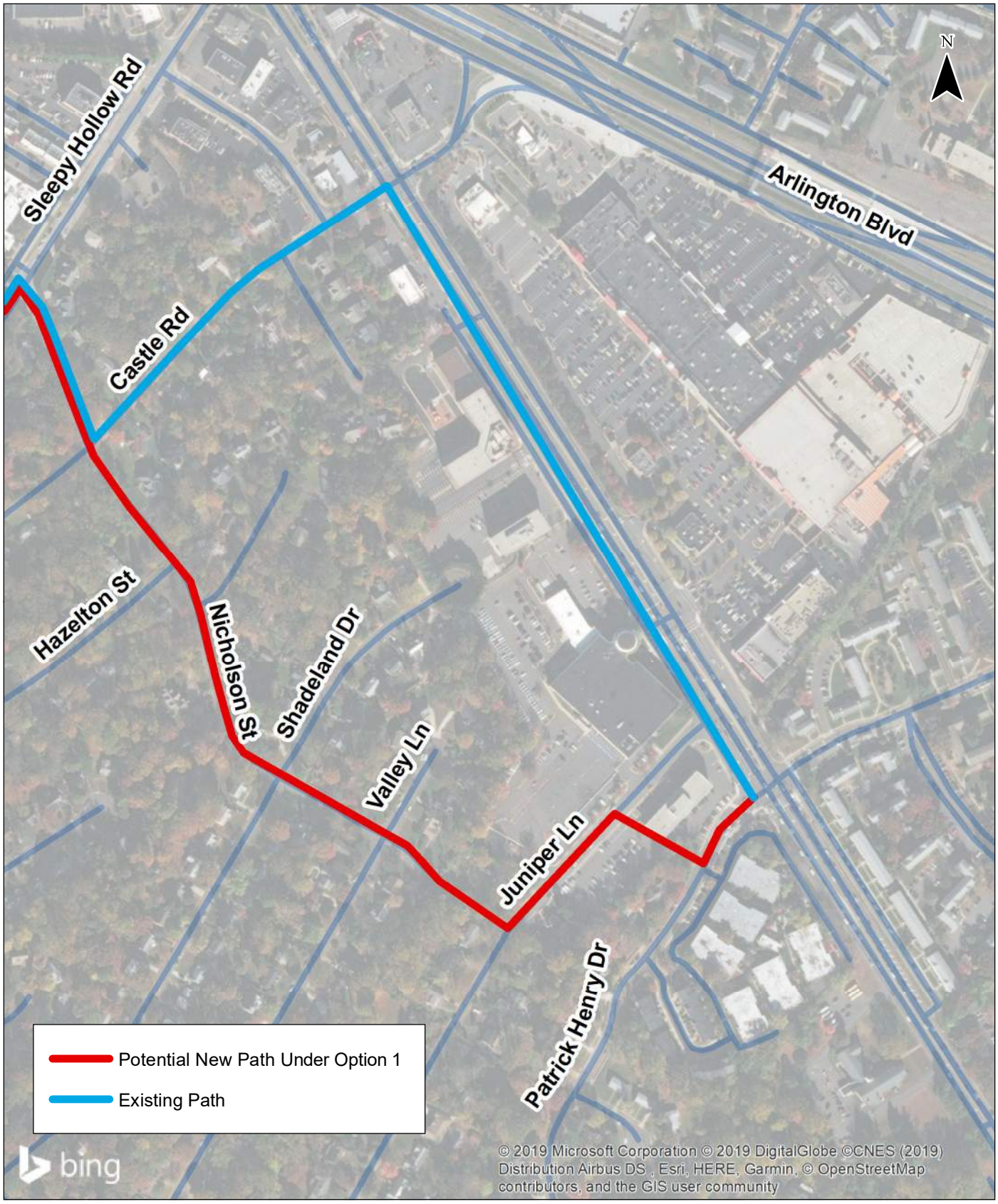
If met, a roadway may benefit from access restrictions to reduce traffic volumes or traffic calming measures (e.g., curb extensions, raised crosswalks, etc.) to slow vehicle speeds.

With the exception of Option 1, all cut-through traffic on Juniper Lane would be derived from site-generated trips related to the Leesburg Pike Village development. For the purposes of this study, all site-generated trips traveling along Juniper Lane were considered "cut-through"; however, in reality, some of these trips may originate from the residential properties directly adjacent to the Leesburg Pike Village.

Cut-through trips under Option 1 also included non-site-related trips utilizing the proposed linkage of Nicholson Street and Patrick Henry Drive via new connections to Juniper Lane. These new connections would likely encourage trips between Route 7 and Sleepy Hollow Road to divert to Nicholson street to avoid signals or congestion on Route 7. **Figure 35** illustrates the existing path many vehicles take between Route 7 and Sleepy Hollow Road (Path 1), as well as, the potential new route under Option 1 (Path 2). To determine the appropriate number of non-site-related trips that may divert to Path 2, a sensitivity test was run on the Option 1 scenario. To be conservative, vehicles were diverted to this new route until one of the following occurred at the applicable intersections:

- Level of service for a particular movement or overall intersection deteriorated to LOS E or LOS F; or,
- Projected 95th percentile queues exceeded available storage.

Figure 36 illustrates the approximate number of non-site-related trips that would divert to use Path 2.



Potential Non-Site Related Cut-Through Trips for Option 1
Juniper Lane Connectivity Study

Figure **35**

H:\22122348 - Juniper Lane Traffic Study\report\draft\Existing Conditions\Cut_Through_Route.mxd - cmildner - 10:02 AM 1/18/2019

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Coordinate System: NAD 1983 StatePlane Virginia North FIPS 4501 Feet

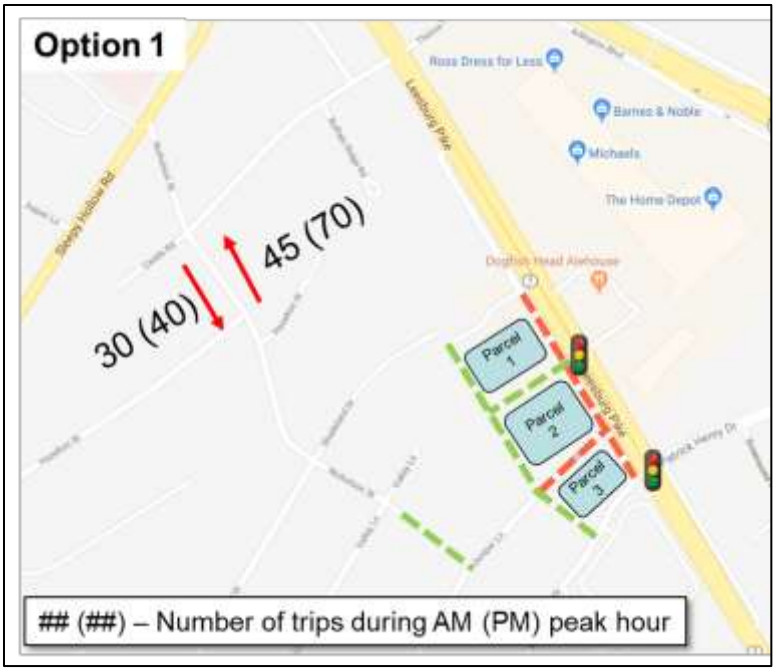

Figure 36. Approximate Number of Non-Site-Related Cut-Through Trips under Option 1

Table 7 illustrates the approximate number of cut-through trips (rounded to nearest 5 trips) for each option based on both site-generated trips (all options) and non-site generated trips (Option 1 only).

Table 7. Anticipated Number of Cut-Through Trips on Juniper Lane by Option

Analysis Period	Travel Direction	Number of Cut-Through Trips							
		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
Weekday AM Peak Hour	Eastbound	40	10	10	10	10	0	10	0
	Westbound	55	10	10	10	10	0	10	0
Weekday PM Peak Hour	Eastbound	60	25	25	30	30	0	30	0
	Westbound	90	20	20	20	20	0	20	0

[1]Option 1 also includes non-site-generated trips diverting to use Nicholson Lane (Figure 37)

As shown, even accounting for both the site-generated trips on Juniper Lane and the non-site-related trips utilizing the new connections, the number of cut-through trips on Juniper Lane are not anticipated to meet County thresholds for access restrictions.

However, not meeting criteria in this planning-level study, does not preclude further evaluation after build-out of the selected option. A before-after study along Juniper Lane and Nicholson Street should be conducted to evaluate the appropriateness of potential access restrictions or traffic calming measures after traffic volumes have redistributed throughout the network.

COMPARISON OF OPTIONS

The eight options were evaluated based on their potential impacts to the transportation system surrounding the study area and nearby neighborhoods, including, but not limited to, intersection delay, level of service, bicycle and pedestrian connectivity, and cut-through traffic. Comparisons include high level pros and cons that aim to inform future redevelopment proposals. The eight options were assessed and narrowed down to three options for additional analysis. **Table 8** displays a summary evaluation of the eight options. The main objectives for comparing the eight options include:

- Limiting cut-through traffic;
- Reducing traffic impacts associated with redevelopment;
- Improving neighborhood connectivity;
- Enhancing traffic operations in the study area; and,
- Considering bicycle and pedestrian conditions and connectivity.

Table 8. Comparison Criteria for Options 1-8

Comparison Criteria	Qualitative Performance of Options							
	1	2	3	4	5	6	7	8
Limits potential for cut-through traffic	○	○	◖	◖	◖	●	◖	●
Reduces traffic impacts associated with redevelopment	●	◖	◖	◖	●	○	◖	○
Improves neighborhood connectivity	●	●	◖	◖	◖	◖	◖	○
Enhances site circulation and traffic operations in the study area	●	◖	◖	●	◖	○	○	○
Minimizing bicycle and pedestrian conflict points	○	○	◖	○	◖	●	●	●

Option 1 Maximum Connections

Figure 37 displays redevelopment plans for Option 1, which contain the maximum number of connections to and through the study area. Roadway connections link Nicholson Street to Juniper Lane to provide neighborhood access to and from the study area. Additional roadway connections provide circulation throughout the study area and provide maximum access points to all parcels from Juniper Lane, Patrick Henry Drive, and Leesburg Pike.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	○
Reduces traffic impacts associated with redevelopment	●
Improves neighborhood connectivity	●
Enhances site circulation and traffic operations in the study area	●
Minimizing bicycle and pedestrian conflict points	○

Figure 37. Option 1 Maximum Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. Direct connections to and from the site from Juniper Lane and Patrick Henry Drive may relieve congestion on Leesburg Pike. Vehicles are provided access to the site from Leesburg Pike, Patrick Henry Drive, and Juniper Lane.

Disadvantages

Some concerns of this option include roadway connectivity from Nicholson Street that may introduce the potential for added cut-through traffic throughout the neighborhood. The number of future trips generated by the Leesburg Pike Village is projected to be low, and a warrant for turn restrictions on to Juniper is not anticipated to be met.

Bicycle and Pedestrian Considerations

Added roadway connections have the potential to provide additional bicycle and pedestrian facilities to improve connectivity. However, additional roadway connections may introduce conflict points and unsafe conditions for bicyclists and pedestrians if adequate facilities are not constructed.

Option 2 Moderate Connections

Redevelopment plans for Option 2 contain fewer connections than Option 1 but present an increase in connectivity and circulation throughout the site through added roadway connections. Similar to Option 1, roadway connections link Nicholson Street to Juniper Lane to provide access to and from the study area. Additional roadway connections provide circulation throughout the study area and provide access

points to Parcels 1 and 2 from Juniper Lane and Leesburg Pike. Parcel 3 is accessed from Patrick Henry Drive. **Figure 38** displays the roadway configuration for Option 2.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	○
Reduces traffic impacts associated with redevelopment	◖
Improves neighborhood connectivity	●
Enhances site circulation and traffic operations in the study area	◖
Minimizing bicycle and pedestrian conflict points	○

Figure 38. Option 2 Moderate Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. A direct connection to and from the site from Juniper Lane may relieve congestion from Leesburg Pike. The potential for cut-through traffic is reduced by not providing a connection between Patrick Henry Drive and Juniper Lane.

Disadvantages

Some concerns of this option include roadway connectivity from Nicholson Street that may introduce the potential for added cut-through traffic throughout the neighborhood. The number of future trips generated by the Leesburg Pike Village is projected to be low, and a warrant for turn restrictions on to Juniper is not anticipated to be met. Parcel circulation may be compromised as a result of not providing connections and circulation between Parcels 1, 2 and 3. There is no direct access from Patrick Henry to Parcels 1 and 2, which may cause additional queueing and congestion along Patrick Henry Drive and Leesburg Pike.

Bicycle and Pedestrian Considerations

Added roadway connections have the potential to provide additional bicycle and pedestrian facilities to improve connectivity. However, additional roadway connections may introduce conflict points and unsafe conditions for bicyclists and pedestrians if adequate facilities are not constructed.

Option 3 Minimal Connections

Redevelopment plans for Option 3 contain the fewest connections, as shown in **Figure 39**. Site access is provided from two access points on Leesburg Pike and one access point from Juniper Lane. Parcel 3 is accessed from Patrick Henry Drive.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	◖
Reduces traffic impacts associated with redevelopment	◖
Improves neighborhood connectivity	◖
Enhances site circulation and traffic operations in the study area	◖
Minimizing bicycle and pedestrian conflict points	◖

Figure 39. Option 3 Minimal Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. A direct connection to and from the site from Juniper Lane may relieve congestion from Leesburg Pike. The potential for cut-through traffic is reduced by not providing a connection between Patrick Henry Drive and Juniper Lane.

Disadvantages

Parcel circulation may be compromised as a result of not providing connections and circulation between Parcels 1, 2 and 3. There is no direct access from Patrick Henry to Parcels 1 and 2, which may cause additional queueing and congestion along Patrick Henry Drive and Leesburg Pike.

Bicycle and Pedestrian Considerations

Added roadway connections have the potential to provide additional bicycle and pedestrian facilities to improve connectivity. However, additional roadway connections may introduce conflict points and unsafe conditions for bicyclists and pedestrians if adequate facilities are not constructed.

Option 4 Site Connections

Redevelopment plans for Option 4 provide maximum connectivity for site circulation. This option creates roadway connections that provide access and circulation to all parcels in the study area. Site access is provided from three access points on Leesburg Pike, one access point from Juniper Lane, and one access point from Patrick Henry Drive, as shown in **Figure 40**.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	◖
Reduces traffic impacts associated with redevelopment	◖
Improves neighborhood connectivity	◖
Enhances site circulation and traffic operations in the study area	●
Minimizing bicycle and pedestrian conflict points	○

Figure 40. Option 4 Site Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. A direct connection to and from the site from Juniper Lane and Patrick Henry Drive may relieve congestion from Leesburg Pike. The potential for cut-through traffic is reduced by not providing a connection between Patrick Henry Drive and Juniper Lane. This option has five access points into the study area, which may help balance the vehicular traffic inflow and outflow to the site.

Disadvantages

The connection between Patrick Henry Drive and Juniper Drive may result in potential cut-through traffic throughout the neighborhood. The number of future trips generated by the Leesburg Pike Village is projected to be low, and a warrant for turn restrictions on to Juniper is not anticipated to be met.

Bicycle and Pedestrian Considerations

Added roadway connections have the potential to provide additional bicycle and pedestrian facilities to improve connectivity. However, additional roadway connections may introduce conflict points and unsafe conditions for bicyclists and pedestrians if adequate facilities are not constructed.

Option 5 Moderate Connections

Figure 41 shows redevelopment plans for Option 5, which provides moderate connectivity for site circulation. This option creates roadway connections that provide access to Parcels 1 and 2 from Leesburg Pike and access to Parcel 3 from Patrick Henry Drive. There is no connection between Parcels 1 and 2 with Parcel 3.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	◖
Reduces traffic impacts associated with redevelopment	●
Improves neighborhood connectivity	◖
Enhances site circulation and traffic operations in the study area	◖
Minimizing bicycle and pedestrian conflict points	◖

Figure 41. Option 5 Moderate Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. A direct connection to and from Parcel 3 from Juniper Lane may relieve congestion from Leesburg Pike. This option provides two access points to Parcel 3, from Patrick Henry Drive and Juniper Lane to improve circulation of vehicles.

Disadvantages

The connection between Patrick Henry Drive and Juniper Drive may result in potential cut-through traffic throughout the neighborhood. The number of future trips generated by the Leesburg Pike Village is projected to be low, and a warrant for turn restrictions on to Juniper is not anticipated to be met. The lack of circulation between all parcels may result in added trips on Leesburg Pike. Vehicles traveling to Parcels 1 and 2 from Juniper Lane or Patrick Henry Drive must access the parcels from Leesburg Pike. Additional queuing may occur at the Patrick Henry / Leesburg Pike intersection as a result of vehicles attempting to access Parcels 1 and 2.

Bicycle and Pedestrian Considerations

Lack of connectivity prevents bicyclists and pedestrians from taking direct routes to destinations. Considerations should be made to add additional bicycle and pedestrian connections where road connections are not present, to provide additional connectivity throughout the study area.

Option 6 Neighborhood Connections

Redevelopment plans for Option 6 provide neighborhood connectivity more than study area connectivity. Similar to Options 2, 3, and 5, there is no connection between Parcels 1 and 2 with Parcel 3. Parcels 1 and 2 have two access points from Leesburg Pike. Parcel 3 has one access point from Patrick Henry Drive, as shown in **Figure 42**.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	●
Reduces traffic impacts associated with redevelopment	○
Improves neighborhood connectivity	◖
Enhances site circulation and traffic operations in the study area	○
Minimizing bicycle and pedestrian conflict points	●

Figure 42. Option 6 Neighborhood Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. The roadway connection between Nicholson Street and Juniper Lane provide neighborhood circulation. Option 6 proposes to remove Juniper Lane connecting to the study area and limits the potential for neighborhood cut-through traffic as a result.

Disadvantages

Option 6 limits neighborhood connectivity to the study area. Vehicles traveling from Nicholson Street, or Juniper Lane do not have direct access to the site and must travel to Patrick Henry Drive or along Leesburg Pike road to access Parcels 1, 2, and 3. The lack of circulation between all parcels may result in added trips on Leesburg Pike. Additional queuing may occur at the Patrick Henry / Leesburg Pike intersection as a result of vehicles attempting to access Parcels 1 and 2.

Bicycle and Pedestrian Considerations

Lack of connectivity prevents bicyclists and pedestrians from taking direct routes to destinations. Considerations should be made to add additional bicycle and pedestrian connections where road connections are not present, to provide additional connectivity throughout the study area. Bicycle and pedestrian facilities should be considered where the Juniper Lane roadway connection is removed. Bicycle and pedestrian facilities could be provided to enhance connectivity and comfort levels by providing bicyclists and pedestrians facilities removed from vehicular activity.

Option 7 Current Comprehensive Plan

Redevelopment plans shown in **Figure 43** for Option 7 are consistent with plans provided by the current Comprehensive Plan. Site access to Parcels 1 and 2 are provided from two access points on Leesburg Pike. Parcel 3 can be accessed from Juniper Lane or Patrick Henry Drive. Similar to Options 2, 3, 5, and 6 there is no connection between Parcels 1 and 2 with Parcel 3.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	◖
Reduces traffic impacts associated with redevelopment	◖
Improves neighborhood connectivity	◖
Enhances site circulation and traffic operations in the study area	○
Minimizing bicycle and pedestrian conflict points	●

Figure 43. Option 7 Current Comprehensive Plan

Advantages

This option maintains a portion of the Leesburg Pike Service Road and limits the amount of construction needed to modify the existing roadway. A direct connection to and from Parcel 3 from Juniper Lane and Patrick Henry Drive may relieve congestion from Leesburg Pike. The potential for cut-through traffic is reduced by not providing a connection between Patrick Henry Drive and Juniper Lane.

Disadvantages

Option 6 limits neighborhood connectivity to the study area. Parcel circulation may be compromised as a result of not providing connections and circulation between Parcels 1, 2 and 3. There is no direct

access from Juniper Lane or Patrick Henry to Parcels 1 and 2, which may cause additional queueing and congestion along Patrick Henry Drive and Leesburg Pike.

Bicycle and Pedestrian Considerations

Lack of connectivity prevents bicyclists and pedestrians from taking direct routes to destinations. Considerations should be made to add additional bicycle and pedestrian connections where road connections are not present, to provide additional connectivity throughout the study area. Additional bicycle and pedestrian connections could be provided to connect Juniper Lane to Parcels 1 and 2, to improve circulation and access to, from, and through the study area.

Option 8 Minimal Connections

Redevelopment plans for Option 8 are similar to Option 6, without providing connection from Nicholson St to Juniper Lane. This option has minimal connectivity at the both the neighborhood and study area levels. Similar to Options 2, 3, 5, 6, and 7 there is no connection between Parcels 1 and 2 with Parcel 3. Parcels 1 and 2 have two access points from Leesburg Pike. Parcel 3 has one access point from Patrick Henry Drive, as shown in **Figure 44**.

Criteria	Qualitative Performance
Limits potential for cut-through traffic	●
Reduces traffic impacts associated with redevelopment	○
Improves neighborhood connectivity	○
Enhances site circulation and traffic operations in the study area	○
Minimizing bicycle and pedestrian conflict points	●

Figure 44. Option 8 Minimal Connections

Advantages

This option removes the Leesburg Pike service road and consequently removes complicated intersections. The removal of the Leesburg Pike Service road creates standard, four-way intersections. Option 8 proposes to remove Juniper Lane connecting to the study area and limits the potential for neighborhood cut-through traffic as a result.

Disadvantages

Option 8 limits neighborhood connectivity to the study area. Vehicles traveling from Nicholson Street, or Juniper Lane do not have direct access to the site and must travel to Patrick Henry Drive or along Leesburg Pike road to access Parcels 1, 2, and 3. The lack of circulation between all parcels may result in added trips on Leesburg Pike. Additional queuing may occur at the Patrick Henry / Leesburg Pike intersection as a result of vehicles attempting to access Parcels 1 and 2.

Bicycle and Pedestrian Considerations

Lack of connectivity prevents bicyclists and pedestrians from taking direct routes to destinations. Considerations should be made to add additional bicycle and pedestrian connections where road connections are not present, to provide additional connectivity throughout the study area. Bicycle and pedestrian facilities should be considered where the Juniper Lane roadway connection is removed. Bicycle and pedestrian facilities could be provided to enhance connectivity and comfort levels by providing bicyclists and pedestrians facilities removed from vehicular activity.

Section 5
Analysis of Preferred Options

ANALYSIS OF PREFERRED OPTIONS

Following the analysis of the eight redevelopment options, three options were selected through collaborative discussions and meetings between Fairfax County staff and community members. For several months, the County facilitated conversations with the community to evaluate and prioritize the options. Community members did not have a consensus view on which options should be selected for additional analysis. Some community members valued connections between the adjacent neighborhoods and the study area, but in general more limited roadway connections were preferred. As such, options with more limited connections were advanced for additional analysis.

The additional analysis presented for these options aims to provide County staff and community members with information to help guide future redevelopment and improve the redevelopment process. This section includes a more detailed analysis and comparison of the three options, including:

- Limiting Cut-Through Traffic;
- Reducing Traffic Impacts Associated with Redevelopment;
- Improving Neighborhood Connectivity;
- Enhancing Traffic Operations in the Study Area; and,
- Providing Bicycle and Pedestrian Connectivity.

Options 3, 7, and 8 were selected based on their alignment with the goals of the County, community, and the Comprehensive Plan. These options were selected based on their potential impacts to circulation, traffic, operations, safety, and connectivity. These metrics are summarized for Options 3, 7, and 8 in **Table 9**.

Table 9. Summary Comparison of Options 3, 7, and 8

Comparison Criteria	Qualitative Performance of Options		
	3	7	8
Limits potential for cut-through traffic	◖	◖	●
Reduces traffic impacts associated with redevelopment	◖	◖	○
Improves neighborhood connectivity	◖	◖	○
Enhances site circulation and traffic operations in the study area	◖	○	○
Minimizing bicycle and pedestrian conflict points	◖	●	●

RENDERINGS OF OPTIONS

Renderings of the transportation network and potential land development have been created to provide an overview of what each of the advanced options might look like in the future. Option 3, 7, and 8 are depicted in **Figure 45, Figure 46**, and **Figure 47**, respectively.

Option 3 in **Figure 45** proposes removing the Leesburg Pike Service Road and adding a circulation road around the site. The circulation road connects to Juniper Lane, providing access to and from the neighborhood.

Figure 45. Option 3 Conceptual Rendering

Option 7 is depicted in **Figure 46** and has a similar site circulation network as Option 8. Parcels 1 and 2 are connected by a site circulation road that provides access to and from the parcels from Leesburg Pike. Option 7 proposes to maintain the existing Juniper Lane roadway connection and provide through access to Leesburg Pike.

Figure 46. Option 7 Conceptual Rendering

Similar to Option 3, Option 8 in **Figure 47** proposes removing the Leesburg Pike Service Road and provides a smaller site circulation road that connects Parcels 1 and 2. This option proposes the fewest roadway connections. Most notably, the Juniper Lane roadway connection to the site is removed in this option. A bicycle and pedestrian path have been proposed where Juniper Lane preexisted. Other sidewalk facilities are depicted to enhance pedestrian connectivity.

Figure 47. Option 8 Conceptual Rendering

LIMITING CUT-THROUGH TRAFFIC

Several community groups expressed concern regarding the potential for vehicular cut-through traffic in the adjacent neighborhoods to the west of the Leesburg Pike Village. The greatest concerns articulated were regarding a potential connection between Nicholson Street and Juniper Lane, as this connection would allow both site and non-site traffic to divert through the neighborhoods. As such, none of the options selected for further analysis include this connection.

Option 3 and Option 7 are anticipated to experience similar levels of cut-through traffic, as a connection between Juniper Lane and the site are maintained. As illustrated in **Table 7**, trips generated from the Leesburg Pike Village are not anticipated to generate enough traffic to warrant turn restrictions on Juniper Lane. Since Option 8 removes Juniper Lane as an access road to and from the Leesburg Pike Village, the potential for site trips traveling through the neighborhood is eliminated. Although this option significantly limits through-traffic in neighborhoods surrounding the Leesburg Pike Village, it increases vehicular capacity demand on Patrick Henry Drive and Leesburg Pike. The subsequent sections evaluate traffic operations and site circulation in more detail.

Although redevelopment plans for the Leesburg Pike Village are not anticipated to result in substantial cut-through traffic, traffic calming options may be available for future conditions if vehicular volumes increase as additional growth and development occurs. Traffic calming measures, such as speed humps, raised crosswalks, curb extensions, lane striping, and more may be used to slow vehicles and, in some cases, limit traffic volumes. Examples of speed bumps, curb extensions, and raised crosswalks are shown below in **Figure 48**. Traffic volumes may be controlled using roadway closures, diverters, lane removal, road diets, and more. These options may be available for Options 3, 7, or 8 as traffic speeds and volumes warrant the installment of these treatments as mitigation strategies.

Figure 48. Traffic Calming Measures

REDUCING TRAFFIC IMPACTS ASSOCIATED WITH REDEVELOPMENT

Connectivity and site circulation are critical components of reducing traffic impacts associated with redevelopment. The roadway configurations for each option propose different road connections that alter the existing site circulation. Currently, the Leesburg Pike Service Road provides a parallel route to Leesburg Pike and serves to collect and circulate vehicles accessing the study area. Options 3, 7, and 8 all propose to remove all or some of the service road. A roadway network is proposed to replace the Leesburg Pike Service Road and provide site circulation behind the development, to the west side of the Leesburg Pike Village.

Option 3 provides site circulation between Parcels 1 and 2. Vehicles are provided access to the Leesburg Pike Village from Leesburg Pike or Juniper Lane. Creating access points on both roads provides improved access and circulation to the site. Parcel 3 must be accessed from Patrick Henry Drive. There is no connection between Parcels 1 and 2 with Parcel 3. Vehicles traveling from Parcels 1 and 2 must travel out onto Leesburg Pike and enter Parcel 3 from Patrick Henry Drive. The lack of connectivity may result in additional vehicular traffic along Leesburg Pike. Additionally, vehicles traveling from Patrick Henry Drive to Parcels 1 and 2 must turn left from Patrick Henry onto Leesburg Pike and turn left again at the entrance to Parcels 1 and 2. Additional left turn queueing may result as demand for Parcels 1 and 2 increases.

Similar to Option 3, Option 7 provides a circulation road connecting Parcels 1 and 2 and providing access directly from Leesburg Pike. Option 7 does not connect Juniper Lane to the circulation road, but instead proposed Juniper connect directly to Leesburg Pike. Vehicles accessing Parcels 1 and 2 from Juniper Lane or Patrick Henry Drive must turn onto Leesburg Pike and access the parcels from Leesburg Pike.

This may result in additional left-turn queueing as the demand for accessing Parcels 1 and 2 increase. Connecting Juniper Lane to Leesburg Pike directly may relieve traffic from Patrick Henry Drive.

Option 8 proposes the fewest roadway connections. This limits site access and circulation within the Leesburg Pike Village. Similar to Options 3 and 7, Parcels 1 and 2 may only be accessed from Leesburg Pike. Option 8 removes Juniper Lane and therefore requires vehicles to access the site from either Leesburg Pike or Patrick Henry Drive. Additional queueing and demand on Patrick Henry Drive are likely to result from removing Juniper Lane.

IMPROVING NEIGHBORHOOD CONNECTIVITY

In addition to circulation and access to the Leesburg Pike Village, access and circulation should be considered throughout the surrounding neighborhood. Existing traffic operations and circulation should not be negatively impacted by redevelopment and roadway configuration. Neighborhood connectivity is assessed by evaluating access points and roadway connections. This section highlights vehicular connectivity; bicycle and pedestrian connectivity options will be discussed in a subsequent section.

Option 3 provides direct neighborhood access to the Leesburg Pike Village. The road configuration allows vehicles to travel directly to the study area without having to travel along Leesburg Pike. This configuration helps to create a more connected, grid-like network that enables efficient routing of vehicles. By providing direct connections, a driver's route is shorter and less circuitous. Option 3 provides more options for accessing the site. By providing multiple access points to the site, traffic and demand on each road is balanced.

Similar to Option 3, Option 7 improves neighborhood connectivity by connecting Juniper Lane to Leesburg Pike. Option 7 is most similar to the existing neighborhood connectivity. Vehicles traveling eastbound along Juniper Lane must turn onto the Leesburg Pike Service Road to access Leesburg Pike. Neighborhoods have direct access to Parcels 2 and 3 along Juniper Lane. Unlike Option 3, vehicles traveling to Parcel 1 must turn onto Leesburg Pike from Juniper Lane. Neighborhood connectivity for Option 7 is slightly less than connectivity provided by Option 3.

Option 8 provides the least amount of neighborhood connectivity. In this option, the neighborhood and the site are not connected. Vehicles are unable to access the Leesburg Pike Village from Juniper Lane. Vehicles must travel to Patrick Henry Drive or Castle Road and onto Leesburg Pike to access the site. This results in a lengthier and more circuitous route.

ENHANCING TRAFFIC OPERATIONS IN THE STUDY AREA

Prior to the identification of the three preferred options, the anticipated impacts of each of the eight options on vehicular traffic operations was evaluated using HCM methodologies using Synchro

software. This analysis provided a macroscopic evaluation of the anticipated LOS and delay for the study intersection and lane groups. To further evaluate the potential impacts of Option 3, Option 7, and Option 8 on vehicular circulation, a series of microsimulations was run for each using SimTraffic software. The SimTraffic analysis is not intended to replace the macroscopic Synchro analysis; rather, it supplements the analysis by simulating real-world traffic flow conditions using microscopic analysis (e.g., lane changing and car-following algorithms).

Table 10 provides a summary of the anticipated 95th-percentile queues for each lane group based on the SimTraffic analysis. Given the assumptions in this study regarding potential land uses, site layout, and trip assignment, the 95th percentile queues listed should be used for relative comparison between options, rather than evaluation of absolute values. The projected length of queues will likely change when proposed land uses and access locations are known. All queues were rounded to the nearest 25 feet, which is the assumed length of the average vehicle. ***Appendix G*** *contains the SimTraffic analysis outputs.*

Table 10. 95th Percentile Queue Comparison – Options 3, 7, & 8 – SimTraffic Analysis

Intersection Information					Weekday AM Peak			Weekday PM Peak		
Intersection (#)	Traffic Control	Approach	Lane Group	Existing/ Assumed turn-lane lengths	Option 3	Option 7	Option 8	Option 3	Option 7	Option 8
Leesburg Pike/Seven Corners Center/Site Access Road A (#1)	Two-Way Stop-Controlled	EB	EBR	-	25	50	25	175	425	400
		NB	NBT	-	0	0	0	0	0	0
		SB	SBT	-	75	300	50	400	485	475
			SBR	150	25	0	0	50	50	75
Leesburg Pike/Seven Corners Center/Site Access Road B (#2)	Signalized	EB	EBLT	-	125	100	100	175	150	150
			EBR	-	50	100	50	75	200	70
		WB	WBL	150	75	175	75	150	375	150
			WBLT	-	50	175	50	100	375	225
			WBR	105	50	50	50	50	50	50
		NB	NBL	150	150	125	150	125	150	125
			NBT	-	350	650	350	300	650	450
			NBR	275	50	25	50	75	25	50
		SB	SBL	475	100	75	75	175	150	200
			SBT	-	275	275	275	300	275	375
			SBR	150	50	25	25	150	100	250

Intersection Information					Weekday AM Peak			Weekday PM Peak		
Intersection (#)	Traffic Control	Approach	Lane Group	Existing/ Assumed turn-lane lengths	Option 3	Option 7	Option 8	Option 3	Option 7	Option 8
Leesburg Pike/ Patrick Henry Drive (#3)	Signalized	EB	EBL	150	125	-	125	100	-	125
			EBTR	-	125	-	125	100	-	100
		WB	WBL	160	125	275	125	200	350	225
			WBTL	-	200	600	200	325	825	525
			WBR	-	100	425	75	100	950	575
		NB	NBL	275	175	450	175	100	500	200
			NBT	-	475	680	475	325	725	1,125
			NBTR	425	400	550	375	275	725	550
		SB	SBL	180	175	175	150	175	225	150
			SBT	-	225	425	225	225	575	225
			SBR	125	25	50	25	25	50	25
Patrick Henry Drive/ Site Access Road C (#4)	Two-Way Stop-Controlled	EB	EBLT	-	275	-	250	75	-	200
		WB	WBTR	-	0	-	0	0	-	25
		SB	SBLR	-	100	-	75	25	-	75
Valley Lane/ Nicholson Street (#8)	Two-Way Stop-Controlled	EB	EBLTR	-	0	0	0	0	0	0
		WB	WBLTR	-	0	0	0	0	0	0
		NB	NBLTR	-	0	0	0	0	0	0
		SB	SBLTR	-	50	50	50	50	50	50
Patrick Henry Drive/ Leesburg Pike Service Road (#9)	Signalized	EB	EBLT	-	-	175	-	-	150	-
			EBT	-	-	225	-	-	250	-
		WB	WBTR	-	-	50	-	-	50	-
		SB	SBLR	-	-	200	-	-	250	-

As shown, most of the projected 95th-pecentile queues at unsignalized intersection are anticipated to be accommodated in the existing or assumed lane storage with the following exception:

- **Leesburg Pike/Seven Corners Center/Site Access Road A**: Queues for the eastbound right-turn movement out of the Leesburg Pike Village are anticipated to reach approximately 17 to 18 vehicles during the weekday p.m. peak hour under Option 7 and Option 8. Relative to Option 3, forecast queues for this movement are considerably longer under these options. Option 3 includes a connection from Parcels 1 and 2 to Juniper Lane, which allows a portion of the site trips destined for the west to avoid Leesburg Pike altogether. As a result, demand for the eastbound right-turn at Site Access Road A is reduced under Option 3, alleviating potential queue built-up at the driveway. The eastbound right-turn queues under Option 7 and Option 8 are also likely exacerbated by queuing and delays experienced at the adjacent Leesburg Pike/Seven Corners Center/Site Access Road B intersection.

Several of the signalized intersections are forecast to experience 95th percentile queuing that would exceed existing lane storage:

- **Leesburg Pike/Seven Corners Center/Site Access Road B**: Northbound queues are anticipated to spill back into the upstream Leesburg Pike/Patrick Henry Drive intersection under Option 7. Queues for the same movements under Option 3 and Option 8 are forecast

to be 25 to 50 percent shorter. Westbound queues under Option 7 are also anticipated to exceed available storage, spilling back into the Seven Corners Center parking lot and likely affecting internal shopping center circulation. Under the assumptions made in this study, the projected queues for the westbound movement under Option 3 and Option 8 are anticipated to have a less substantial impact on the westbound approach. As projected volumes between the three options are not drastically different at his intersection, the increases in queuing anticipated under Option 7 likely stem from operations at the adjacent Leesburg Pike/Patrick Henry Drive intersection.

- **Leesburg Pike/Patrick Henry Drive & Patrick Henry Drive/Leesburg Pike Service Road**: Queues at this intersection are anticipated to be substantially longer under Option 7 relative to Option 3 and Option 8. Perhaps the largest contributing factor in the deterioration under Option 7 is the inclusion of the Leesburg Pike Service Road approach to the signal. Adding (or rather retaining) this approach/movement adds an additional phase to the signal cycle, effectively reducing the available green time for other mainline movements. Queues on the other approaches inevitably grow longer while the service road approach is being served. These findings coincide with the increased delay forecasted in the macroscopic Synchro analysis of this intersection.

    - Perhaps the most notable impact of the increased queuing under Option 7 occurs on the eastbound Patrick Henry Drive approach. Projected queues are forecast to spill back beyond the site frontage of Parcel 3. As no direct access to Parcel 3 was assumed under Option 7, this queue spillback was accommodated without impacts to site circulation. However, future analyses of Option 7 should remain cognizant of this queue potential if direct access to Patrick Henry is proposed at the time of development.

    - Eastbound queues on Patrick Henry under Option 3 and Option 8 are not anticipated to spill back beyond the site frontage. As direct access between Parcel 3 and Patrick Henry Drive would be required under these options (no other site frontage available for driveway access), the location and configuration of Site Access Road C (serving Parcel 3 on Patrick Henry Drive) should be evaluated against VDOT and County access management standards and undergo further, more informed microsimulation analysis.

CONSIDERING BICYCLE AND PEDESTRIAN CONDITIONS AND CONNECTIVITY

Redevelopment of the existing site creates the potential to enhance the existing bicycle and pedestrian infrastructure. The Comprehensive Plan designates the site as the Leesburg Pike Village, an opportunity area that emphasizes transit-oriented and mixed-use development. The Leesburg Pike Village is envisioned to be an activity node within the Seven Corners CBC with distinct character. Bicycle and pedestrian infrastructure encourage people to visit and enjoy the area. Several community members

have emphasized bicycle and pedestrian connectivity to and from the site as a priority. Bicycle and pedestrian infrastructure within the Leesburg Pike Village will be most effective if it connects to a larger network of bicycle and pedestrian infrastructure. Connectivity is a critical component in encouraging active transportation throughout the study area. Bicycle infrastructure and sidewalks within the study area should connect to infrastructure outside of the study area, throughout the rest of the Seven Corners CBC.

Juniper Lane could directly link nearby neighborhoods to the Leesburg Pike Village. As shown in **Figure 49** below, Juniper Lane is a very wide bi-directional, two-lane road with street parking on both sides. The road measures approximately 40' curb to curb. Sidewalk facilities are provided along a portion of the road, near the proposed Leesburg Pike Village. The existing roadway width of Juniper Lane is wider than necessary to accommodate current and future vehicle speeds and volumes. The existing on street parking is scattered along the road. Portions of the roadway near the Leesburg Pike Service Road are marked No Parking, and other portions of Juniper Lane have parking signs that read, "No Parking 7:00 PM – 7:00 AM." Juniper Lane is surrounded by surface parking spaces on the north and south. The existing parking along Juniper Lane does not currently exhibit a high demand, however, as future redevelopment occurs, parking demands may shift.

The conceptual bicycle and pedestrian improvements are intended to provide planning level considerations about how connectivity can be improved within the study area. A detailed analysis would need to be conducted to assess the feasibility of implementing the featured bicycle and pedestrian treatments. This section contains options for redesign that incorporate bicycle and pedestrian improvements for Options 3, 7, and 8.

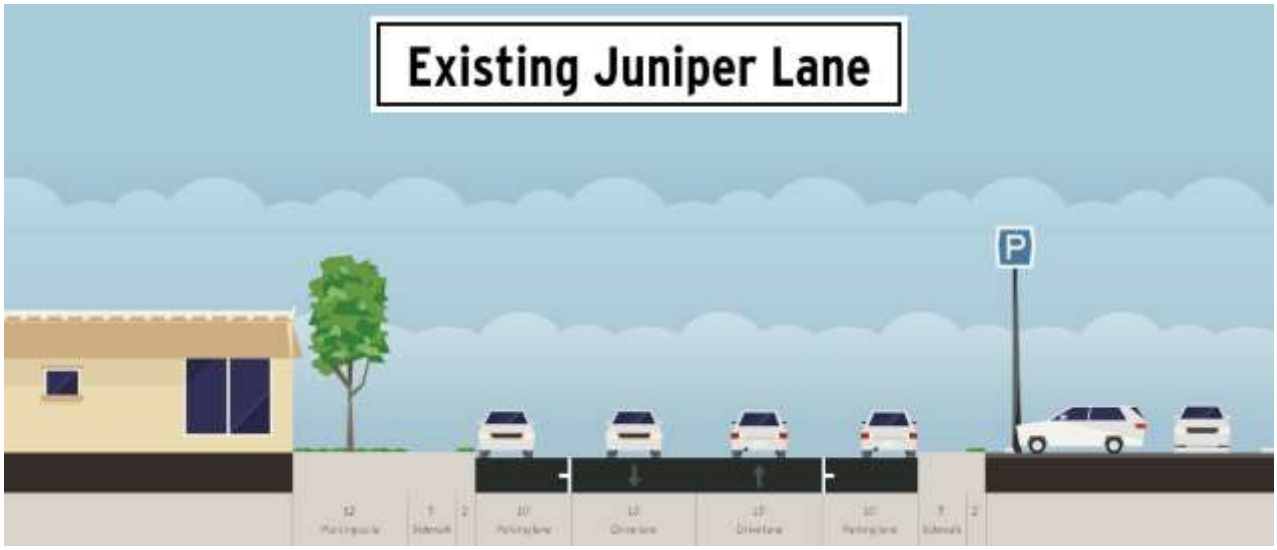

Figure 49. Existing Juniper Lane Cross Section

Options 3 and 7 maintain the Juniper Lane roadway connection. Bicycle and pedestrian infrastructure must be considered along Juniper Lane if connectivity is desired to, from, and through the Leesburg Pike Village. The existing roadways allows for the addition of buffered bicycle lanes to replace the

underutilized street parking along the commercial portion of Juniper Lane. The residential portion of Juniper Lane likely has parking demand that varies from the demand along the commercial portion of Juniper. The residential portion of Juniper Lane is not included in this concept. **Figure 50** depicts a potential option for roadway redesign that improves bicycle and pedestrian infrastructure along Juniper Lane. Sidewalks are widened from their current width of 5 feet to 8 feet to meet the standards for the Americans with Disabilities Act (ADA). If the on-street parking were to be removed and the travel lanes narrowed to 11 feet, the extra space could accommodate 6-foot bicycle lanes with a 3-foot buffer. As mentioned previously, these options for improved bicycle and pedestrian connectivity will only be effective if they serve as part of a larger connected network of bicycle and pedestrian facilities.

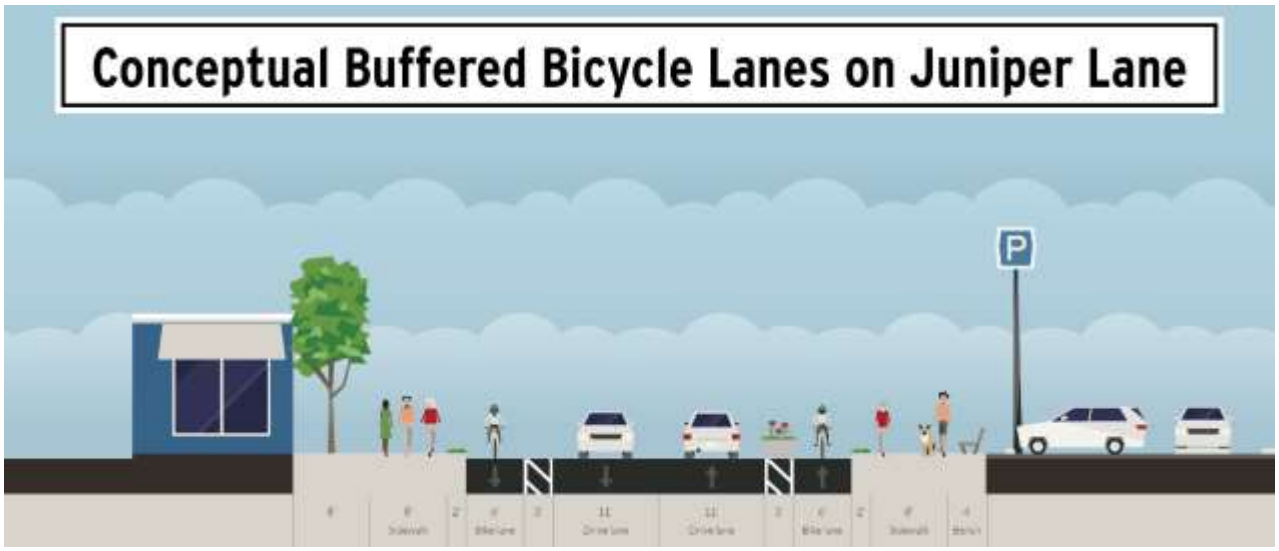

Figure 50. Juniper Lane Options 3 and 7 Conceptual Bicycle and Pedestrian Improvements

Option 8 removes Juniper Lane altogether. **Figure 51** conceptualizes a redesign of Juniper Lane. This concept reallocates the roadway from vehicles to bicycles and pedestrians. There are many options for redesign that improve the experience of bicyclists and pedestrians. The main objective is to maintain Juniper Lane as a connection for bicyclists and pedestrians, while closing it to vehicular traffic. Removing bicyclists and pedestrians from the vehicular path significantly reduces risk of conflict, improves safety for all users, and improves the level of comfort for bicyclists and pedestrians.

The repurposing of Juniper Lane could serve many purposes, whether it be encouraging active transportation by providing a multi-use path or creating public space for pocket parks, festivals, food trucks, or events.

Figure 51. Juniper Lane Option 8 Conceptual Bicycle and Pedestrian Connectivity

Section 6
Conclusions and Recommendations

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

As illustrated through the analyses in this report, each of the eight options possess their own, unique advantages and disadvantages. Each were assessed based on criteria established after conversations with the County and the community. The evaluation metrics include:

- Limiting Cut-Through Traffic;
- Reducing Traffic Impacts Associated with Redevelopment;
- Improving Neighborhood Connectivity;
- Enhancing Traffic Operations in the Study Area; and,
- Providing Bicycle and Pedestrian Connectivity.

Inherently, several of these evaluation metrics represent competing interests. Improving neighborhood connectivity to the surrounding roadway network often comes at the expense of increasing cut-through traffic through the neighborhoods. Prioritizing improvements to vehicular traffic operations often limits the potential for creating low-stress bicycle and pedestrian environments. The intent of this report is not to identify a single preferred option, as what is considered 'preferred' is dependent on one's perspective and goals. Rather, this report is meant to provide the information and analysis to help inform the community, the County, and potential land developers on how to balance potentially conflicting interests. While certainly not all-encompassing or fully-informed as to the particulars of any future proposed development, the analysis conducted should serve as a basis for future discussions and as a means of further developing community goals and interests.

The following sections provide a summary of the findings for each of the preferred options.

Option 3

Relative to Options 7 and 8, Option 3 is likely to provide the most efficient site circulation and result in the lowest traffic impacts associated with redevelopment of the site. Under this option, the connections to both Juniper Lane and Leesburg Pike allow site trips to efficiently distribute throughout the roadway network without the need for substantial out-of-direction travel. This improved circulation, in turn, improves the anticipated operations at the study intersections relative to the other options. By maintaining the Juniper Lane connection from the neighborhood to the Leesburg Pike Village, Option 3 does not eliminate cut-through traffic. However, the Juniper Lane roadway connection improves neighborhood connectivity by providing the neighborhood direct access to Leesburg Pike and

the Leesburg Pike Village. Much like the other options, Option 3 does not preclude the provision of key bicycle and pedestrian improvements, including along Juniper Lane.

Option 7

Similar to Option 3, Option 7 does not prevent cut-through traffic from accessing Juniper Lane and the surrounding neighborhood streets. Maintaining the connection between Juniper Lane and the Leesburg Pike Service Road Juniper Lane provides neighborhood connectivity but does not allow for complete site circulation like under Option 3. Access to Juniper Lane would likely only be provided to a portion of the site, forcing other parts of the site to access Leesburg Pike directly. As Option 7 is the only alternative that maintains a portion of the Leesburg Pike Service Road, the forecast delays and queues at the study intersection were noticeably higher during the weekday a.m. and weekday p.m. peak hours. Like Option 3, Option 7 has the potential to provide key bicycle and pedestrian improvements along Juniper Lane.

Option 8

Given the lack of proposed roadway connections, Option 8 is the best alternative for limiting cut-through traffic and providing low-stress bicycle and pedestrian facilities. Eliminating access from Juniper Lane to the Leesburg Pike Village prevents vehicles from cutting-through the neighborhood. Additionally, the preexisting Juniper Lane roadway can be repurposed into a multi-use trail for bicyclists and pedestrians. However, this option has the fewest roadway connections and limited site circulation as a result. The limited road network results in longer queues at several intersections. Forecast delays and queuing is worse than Option 3, though not as severe as under Option 7.

RECOMMENDATIONS

Access Considerations

While all proposed access points to the Leesburg Pike Village should be evaluated based on VDOT and County access management standards, the location and configuration of any access proposed on Patrick Henry Drive, in particular, should be evaluated based on a detailed operational analysis. Queue spillback from the Leesburg Pike Road/Patrick Henry Drive intersection may directly impact the circulation at a proposed access point for the site. If direct access to the site via Patrick Henry Drive is deemed necessary from an operational or circulation standpoint, alternative access configurations (such as right-in/right-out) should be considered to potentially mitigate impacts and conflicts between the two adjacent intersections.

Design Considerations

The operational analysis illustrated many of the existing turn-lanes would not be able to accommodate projected 95th percentile queues during the weekday a.m. and p.m. peak hours. The length of turn-lanes and tapers serving site-generated trips should be evaluated for appropriateness based on

anticipated levels of queuing, as well as VDOT and County design standards when the site is redeveloped.

Bicycle and Pedestrian Considerations

Bicycle and pedestrian infrastructure improvements should focus on creating a connected system of comfortable facilities. Existing bicycle and pedestrian facilities surrounding the Leesburg Pike Village are limited and often isolated. As such, improvements should be targeted at existing gaps in the network to help create a more holistic and complete system for pedestrians and bicyclists. Whether utilizing existing roadway cross-sections to develop bike lanes or adding new infrastructure along site frontage, significant opportunities exist for connecting the Leesburg Pike Village with the surrounding neighborhoods. Establishing a connection between Juniper Lane and the site is likely the most important aspect in achieving this goal. Efforts should be made to either add infrastructure to the current cross-section of Juniper Lane, or in options where Juniper Lane is eliminated along the site frontage, mixed-use trails should be provided in its place. In addition to providing new infrastructure, any existing facilities proposed to remain should be modified to meet the current accessibility requirements established by in Americans with Disabilities Act (ADA) standards.

Section 7

References

REFERENCES

1. Fairfax County. Fairfax County Comprehensive Plan, 2017 Edition. Accessed April 2018. https://www.fairfaxcounty.gov/planning-zoning/fairfax-county-comprehensive-plan

2. Maaza C. Mekuria, Peter G. Furth, and Hilary Nixon. *Low-Stress Bicycling and Network Connectivity.* Mineta Transportation Institute. 2012. Accessed October 24, 2018. https://transweb.sjsu.edu/research/low-stress-bicycling-and-network-connectivity

3. Transportation Research Board. Highway Capacity Manual. 2010.

4. Institute of Transportation Engineers. *Trip Generation, 10th Edition.* 2017.