



AlexWEST

DRAFT Traffic Study

ALEXANDRIA, VIRGINIA

Prepared for:

CITY OF ALEXANDRIA

OCTOBER 2023

Prepared By:

Kimley»»Horn

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EXECUTIVE SUMMARY

The City of Alexandria is updating their long-term vision for the 1992 Alexandria West Plan, which will include the integration of the 2012 Beauregard Plan as part of the process. The updated vision will evaluate modifications to the currently proposed land use plan, assess the proposed transportation infrastructure, and engage in public outreach to the community. In support of this planning process, a planning-level transportation study was prepared to evaluate the impacts of both the existing traffic demand and future traffic demand on the surrounding transportation network. Note that this transportation study does not take the place of additional transportation studies for individual development sites as required by the City's [Transportation Planning Administrative Guidelines](#).

A traffic study will be prepared to evaluate the impacts of the changing traffic demands on the surrounding transportation network. Major study area corridors include N Beauregard Street, Seminary Road, Little River Turnpike, W Braddock Road, Sanger Avenue, and King Street. The traffic study will analyze the transportation network under the following land use scenarios:

- 2022 Existing Conditions
- 2045 Base Conditions (based on the currently Forecasted Land Use)
- 2045 Sensitivity Tests (six future alternative scenarios based on different estimated future traffic demands)

The results of the existing conditions analysis outlined in this chapter of the transportation study report are summarized below.

The Synchro traffic analyses are generally consistent with observed field conditions. On the N Beauregard Street corridor, the greatest operational challenges were observed in locations which provide access to I-395, namely, Little River Turnpike, Seminary Road, and King Street. These locations, which experience high demand from both the N Beauregard Street corridor and the connecting streets providing access to I-395, were shown to have significant delays along mainline northbound and southbound N Beauregard Street. Relatively few operational challenges were observed on the rest of the N Beauregard Street corridor, except in locations directly adjacent to schools or high-density residential developments. In these locations, mainline turning movements and minor street approaches were subject to greater delays compared to mainline northbound and southbound through movements on N Beauregard Street.

On the Seminary Road corridor, delays were also primarily experienced by mainline turning vehicles and vehicles on minor street approaches to Seminary Road. West of N Beauregard Street, where the land use is primarily low-density residential, the unsignalized intersections operated with little delay, even to minor street approaches. The signalized intersection of Seminary Road and Dawes Avenue, which is adjacent to commercial and industrial uses, experienced moderate minor street delays. East of N Beauregard Street, delays were also primarily experienced by mainline turning vehicles and vehicles on the minor street approaches to Seminary Road.

Generally, AM peak hour delays were slightly greater than PM peak hour delays, and more significantly so in areas adjacent to schools. PM peak hour delays than AM peak hour delays were greater in areas adjacent to commercial uses, as recorded in field observations and indicated by traffic analysis.

1. INTRODUCTION

The City of Alexandria is updating their long-term vision for the 1992 Alexandria West Plan, which will include the integration of the 2012 Beauregard Plan as part of the process. The updated vision will evaluate modifications to the currently proposed land use plan, assess the proposed transportation infrastructure, and engage in public outreach to the community. In support of this planning process, a planning-level transportation study was prepared to evaluate the impacts of both the existing traffic demand and future traffic demand on the surrounding transportation network. Note that this transportation study does not take the place of additional transportation studies for individual development sites as required by the City's [Transportation Planning Administrative Guidelines](#).

1.1 ALEXANDRIA WEST PLANNING AREA

The study area for the overall Small Area Plan (SAP) will encompass the entire Alexandria West Plan Area, shown in **Figure 1-1**, as designated by the City. This study area is generally bound by I-395 to the south, Arlington County to the east, and Fairfax County to the north and west. Major study area corridors include Beauregard Street, Seminary Road, W Braddock Road, Duke Street and King Street. This area is served by numerous local transit routes, which will be enhanced in the future with the planned West End Transitway Bus Rapid Transit line.

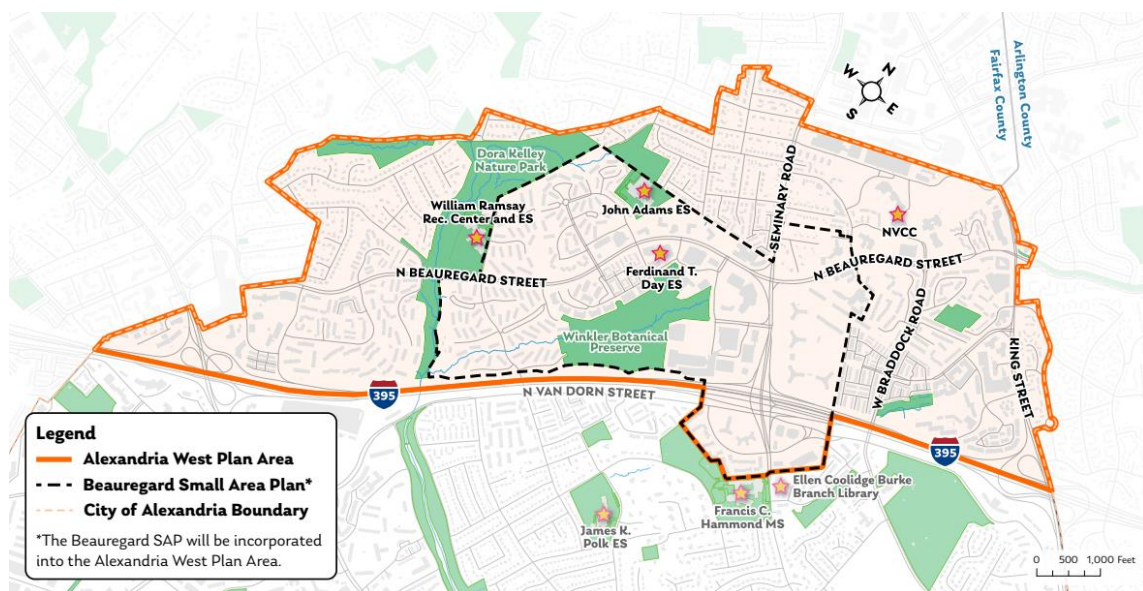


Figure 1-1: Alexandria West Planning Area

1.2 ALEXANDRIA WEST LAND USE

The previous land use plans for this area were developed 10-30 years ago. As such, the City seeks to update these plans comprehensively in order to:

- address current community needs and incorporate current City policies and best practices
- address the issue of housing vulnerability and affordability by leveraging housing resources, policies, and funding opportunities to meet this challenge
- develop an approach to guide and shape future development and make expectations clear for the community, City, and developers

In order to evaluate the changing traffic demands on the transportation network, a variety of “sensitivity tests” will be conducted to determine the impact of various possible future traffic demand scenarios. These will be compared to the existing conditions and the future conditions based on the currently forecasted land use. The following describes a brief methodology for this process.

1.3 TRAFFIC STUDY SCENARIOS

A traffic study will be prepared to evaluate the impacts of the changing traffic demands on the surrounding transportation network. Major study area corridors include N Beauregard Street, Seminary Road, Little River Turnpike, W Braddock Road, Sanger Avenue, and King Street. The traffic study will analyze the transportation network under the following land use scenarios:

- 2022 Existing Conditions
- 2045 Base Conditions (based on the currently Forecasted Land Use)
- 2045 Sensitivity Tests (six future alternative scenarios based on different estimated future traffic demands)

The existing conditions will serve as a baseline comparison scenario for all future conditions. 2045 base conditions with the currently forecasted land use and evaluated sensitivity test scenarios will provide an understanding of how changes to future traffic demands and patterns will impact the 2045 planned future transportation network.

For the purposes of this traffic study, 15 intersections in and around the Alexandria West plan boundary were studied, as shown in **Figure 1-2**. Intersection capacity analysis and queuing analyses will be performed at each study intersection for each analysis condition. See **Table 2-1** for intersection names.

Detailed descriptions of each analysis scenario and the analysis methodologies are outlined in the subsequent sections of this report. This chapter will address the existing conditions scenario.



Figure 1-2: Traffic Study Area

2. STUDY AREA TRANSPORTATION NETWORK

2.1 STREET NETWORK

The existing street network considered as part of this study extends along the N Beauregard Street and Seminary Road corridors. 13 signalized intersections and two (2) unsignalized intersections represent the existing study area. The following is a brief description of the surrounding street network, study intersections, and study area observations.

STUDY AREA STREETS

The following is a descriptive listing of each of the roadways within the study area. The roadways are categorized according to their location along the main study area corridors of N Beauregard Street (north-south) and Seminary Road (east-west). All average annual daily traffic (AADT) data reported below are from VDOT 2021 Traffic Data.

N Beauregard Street Corridor

N Beauregard Street (Route 6622 within the City of Alexandria, Route 713 within Fairfax County) is a north-south road which runs parallel to I-395. N Beauregard Street terminates at Observation Way on the south end. On the north end, the roadway becomes **S Walter Reed Drive** at King Street and continues northbound, terminating at Washington Boulevard. It is a four-lane divided road with additional turn lanes and is separated by a raised median. In the study area vicinity, the AADT ranges from 12,000 vehicles (within the City of Alexandria) to 28,000 vehicles (within Fairfax County). The road has a posted speed limit of 25 mph south of Armistead Drive and 35 mph north of Armistead Drive within the study area.

Little River Turnpike (Route 236) is an east-west road which terminates at I-66 on the west and Strand Street (in the Old Town Alexandria Waterfront) on the east. It should be noted that the roadway is renamed as Main Street to the west and Duke Street to the east. It is a four-lane divided road with additional turn lanes and is separated by a raised median. In the study area vicinity, the AADT is approximately 28,000 vehicles. The road has a posted speed limit of 40 mph. Little River Turnpike outside of the city limits is maintained by VDOT and Fairfax County.

Gloucester Road is an east-west two-lane undivided roadway that provides access to roughly a dozen single-family residences and a place of worship. The road connects to N Beauregard Street on the east end and terminates in a dead-end on the west end. The road has no posted speed limit.

Lincolnia Road (Route 8) is an east-west two-lane undivided roadway that provides access to residential and commercial developments south of N Beauregard Street. Between N Breckenridge Place and N Beauregard Street, the AADT is approximately 3,400 vehicles. The road has no posted speed limit.

Quantrell Avenue is an east-west two-lane undivided roadway which terminates at N Beauregard Street on the west end and becomes a westbound-only road for vehicles exiting southbound I-395 on the east end. The road has a posted speed limit of 25 mph.

Sanger Avenue (Route 6702) is an east-west road that provides access to residential neighborhoods to the west and east of N Beauregard Street. It also provides access to William Ramsay Elementary School, which is immediately west of the intersection of Sanger Avenue and N Beauregard Street. West of N Beauregard Street, it is a two-lane undivided road. East of N Beauregard Street, it is a two-lane undivided

road with parking, except during the peak hours of 7AM to 9AM and 4PM to 6PM, during which time it is a four-lane roadway. In the study area vicinity, the 2021 AADT is approximately 12,000 vehicles. The road has a posted speed limit of 25 mph.

Mark Center Drive is an east-west road that provides access to office and residential buildings to the west and east of N Beauregard Street. It also provides connection to the Mark Center Transit Center, which serves numerous DASH, WMATA, Fairfax Connector, and Omniride bus routes. It is a four-lane road with additional turn lanes and is separated by a raised median. Between Highview Lane and Mark Center Avenue, the roadway is undivided. The road has a posted speed limit of 25 mph.

E Campus Drive is an east-west road which connects to N Beauregard Street on the east end and provides access to Northern Virginia Community College - Alexandria Campus on the west side. It is a four-lane median-separated roadway. The road has no posted speed limit.

W Braddock Road (Route 6592) is an east-west road which connects to N Beauregard Street on the west end and terminates at N West Street (near the Braddock Road Metrorail Station) on the east end. Within the study area vicinity, the road is a four-lane road with additional turn lanes and is separated by a raised median. The 2021 AADT along the road in the study area vicinity is approximately 10,000 vehicles. The road has a posted speed limit of 35 mph.

King Street (Route 7) is an east-west road which becomes Leesburg Pike west of Dawes Avenue in Fairfax County, and terminates at Strand Street (in Old Town Alexandria Waterfront) on the east end. Within the study area vicinity, it is a four-lane undivided road with additional turn lanes. The 2021 AADT along the roadway in the study area vicinity is 40,000 vehicles. The road has a posted speed limit of 35 mph within the study area vicinity.

N Hampton Drive (Route 6711) is a north-south road that provides access to residential developments south of King Street. It is a two-lane road with additional turn lanes, bike lanes, and parking lanes. It is primarily separated by a raised median, though sections along the roadway are undivided. In the study area vicinity, the 2021 AADT along the roadway is 5,000 vehicles. The road has a posted speed limit of 25 mph.

Seminary Road Corridor

Seminary Road (Route 6706 west of I-395, Route 420 east of I-395) is an east-west road which runs parallel to Route 7 and provides connection to Route 7 on each end. It is primarily a four-lane undivided road with additional turn lanes. It should be noted that between N Beauregard Street and Library Lane, the roadway becomes divided and is separated by a raised median. In the study area vicinity, the AADT ranges from 14,000 vehicles (east of I-395) to 41,000 vehicles (west of I-395), as reported in 2021 VDOT traffic data. The road has a posted speed limit of 25 mph.

Dawes Avenue is a north-south road that provides access to residential neighborhoods west of Seminary Road and commercial and office developments and Northern Virginia Community College - Alexandria Campus east of Seminary Road. It is a two-lane undivided road with additional turn lanes. The road has a posted speed limit of 25 mph.

Fillmore Avenue is a north-south two-lane undivided road that provides access to residential neighborhoods north and south of Seminary Road. The road terminates at Seminary Road on the south end and N Beauregard Street on the north end. The road has a posted speed limit of 25 mph.

Fairbanks Avenue is a north-south two-lane undivided road that provides access to residential neighborhoods north and south of Seminary Road. The road has no posted speed limit.

Mark Center Avenue is a north-south road which terminates at Mark Center Drive on the south end and Seminary Road on the north end. It also provides connection to the Mark Center Transit Center, which serves numerous DASH, WMATA, Fairfax Connector, and Omniride bus routes. It is primarily a four-lane road with additional turn lanes and is separated by a raised median. The road has a posted speed limit of 25 mph.

Kenmore Avenue is a north-south two-lane undivided road that provides access to residential developments south of Seminary Road. The road has no posted speed limit.

Library Lane is a north-south two-lane undivided road that provides access to commercial developments and the Ellen Coolidge Burke Branch public library north of Seminary Road. The road has no posted speed limit.

STUDY INTERSECTIONS

The vehicular impacts of the proposed land use plan were studied at the study intersections listed in **Table 2-1**. The existing lane designations and traffic control at the study intersections are shown in **Figure 2-1**.

Table 2-1: Existing Study Area Intersections

Study Intersection	Signalization
1. N Beauregard Street and Little River Turnpike	Signalized
2. N Beauregard Street and Gloucester Road/Lincolnia Road	Signalized
3. N Beauregard Street and Quantrell Avenue	Signalized
4. N Beauregard Street and Sanger Avenue	Signalized
5. N Beauregard Street and Mark Center Drive	Signalized
6. N Beauregard Street and Seminary Road	Signalized
7. N Beauregard Street and E Campus Drive/W Braddock Road	Signalized
8. N Beauregard Street/S Walter Reed Drive and King Street	Signalized
9. King Street and N Hampton Drive	Signalized
10. W Braddock Road and N Hampton Drive	Signalized
11. Seminary Road and Dawes Avenue	Signalized
12. Seminary Road and Fillmore Avenue	Unsignalized
13. Seminary Road and Fairbanks Avenue	Unsignalized
14. Seminary Road and Mark Center Avenue	Signalized
15. Seminary Road and Kenmore Avenue/Library Lane	Signalized

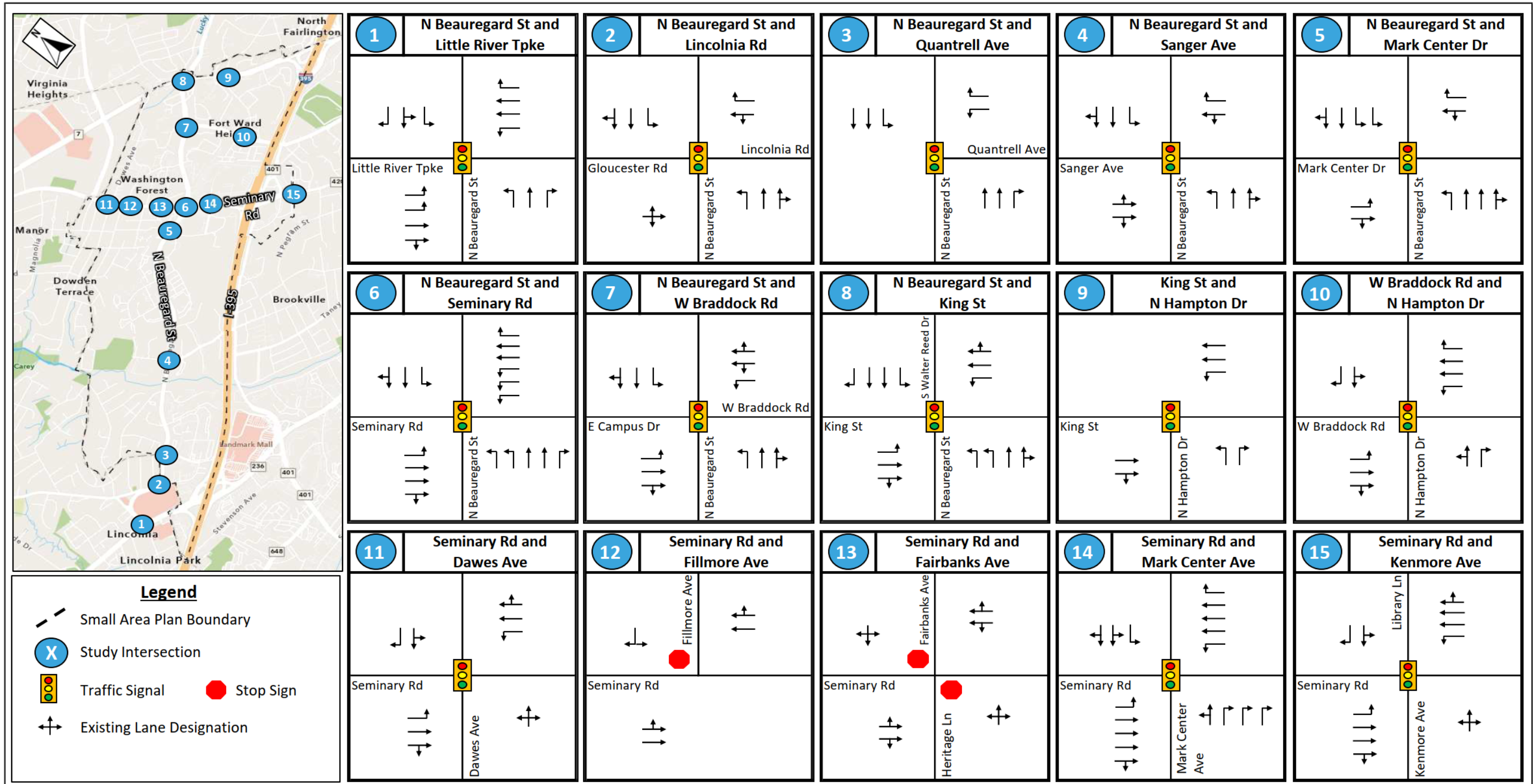


Figure 2-1: Existing Lane Designations and Traffic Control

3. EXISTING TRAFFIC OPERATIONS ANALYSIS

3.1 DATA COLLECTION

Traffic count data was collected at the study area intersections between December 2022 and April 2023. Data was collected at the majority of study intersections on Tuesday, December 13, 2022.

The following intersections had different collection dates due to observed issues on the initial day of collection:

- Seminary Road and Kenmore Avenue/Library Lane – Original data collected at incorrect intersection
- N Beaugard Street and Little River Turnpike – Traffic incident on Little River Turnpike
- N Beaugard Street and Lincolnia Road – Traffic incident on Little River Turnpike impacts
- N Beaugard Street and Quantrell Avenue – Traffic incident on Little River Turnpike impacts

As a result of these issues, data at the intersections listed above were collected on other dates. A summary of the data collection dates which represent the 2022 existing conditions is provided in **Table 3-1**.

Table 3-1: Traffic Count Data Collection Summary

Study Intersection	Data Collection Date	
	AM Peak Hour	PM Peak Hour
1. N Beaugard Street and Little River Turnpike	Tuesday, December 13, 2022	Thursday, April 27, 2023
2. N Beaugard Street and Gloucester Road/Lincolnia Road	Tuesday, December 13, 2022	Thursday, April 27, 2023
3. N Beaugard Street and Quantrell Avenue	Tuesday, December 13, 2022	Thursday, April 27, 2023
4. N Beaugard Street and Sanger Avenue	Tuesday, December 13, 2022	
5. N Beaugard Street and Mark Center Drive	Tuesday, December 13, 2022	
6. N Beaugard Street and Seminary Road	Tuesday, December 13, 2022	
7. N Beaugard Street and E Campus Drive/W Braddock Road	Tuesday, December 13, 2022	
8. N Beaugard Street/S Walter Reed Drive and King Street	Tuesday, December 13, 2022	
9. King Street and N Hampton Drive	Tuesday, December 13, 2022	
10. W Braddock Road and N Hampton Drive	Tuesday, December 13, 2022	
11. Seminary Road and Dawes Avenue	Tuesday, December 13, 2022	
12. Seminary Road and Fillmore Avenue	Tuesday, December 13, 2022	
13. Seminary Road and Fairbanks Avenue	Tuesday, December 13, 2022	
14. Seminary Road and Mark Center Avenue	Tuesday, December 13, 2022	
15. Seminary Road and Kenmore Avenue/Library Lane	Tuesday, January 31, 2023	

All AM data collection occurred from 6:00 AM to 9:00 AM, and all PM data collection occurred from 3:30 PM to 7:30 PM. See **Appendix A** for full traffic count data and descriptions of observed data collection issues on December 13, 2022.

3.2 FIELD OBSERVATIONS

Field observations were conducted on Tuesday, February 14, 2023 to confirm existing AM and PM traffic signal timing and phasing, observe any abnormalities in existing traffic operations, and make note of any notable gaps in the existing pedestrian, bicycle, and transit networks. The following observations are noted in this report to provide background information which may provide context for apparent abnormalities in the transportation network analysis or public perceptions of unsafe or burdensome locations within the study area.

Violations of Prohibited Turning Movements

- While existing signage prohibits U-turns, significant U-turn volumes were observed in the following locations or were captured in the traffic count data:
 - Westbound U-turn at N Beauregard Street and Little River Turnpike (11 U-turns counted in the PM peak hour traffic count data collection)
 - Eastbound U-turn at Seminary Road and Kenmore Avenue/Library Lane (29 U-turns counted in the AM peak hour traffic count data collection)
- Although signage prohibits left turns from Seminary Road onto Heritage Lane on weekdays from 4:00 to 6:00 PM, 9 left turns were captured in this location in the PM peak hour traffic count data collection, the same number of left turns captured in the AM peak hour.

Pedestrian Crossing Observations

- The following signals were observed to have exclusive pedestrian phases, meaning that when a pedestrian push button is activated at the intersection, all vehicle movements are prohibited during the pedestrian phase:
 - N Beauregard Street and Sanger Avenue
 - Seminary Road and Kenmore Avenue/Library LaneThis is due to the proximity of each intersection to an ACPS school (William Ramsey Elementary School and Francis C. Hammond Middle School, respectively).
- The unsignalized pedestrian crossing of Seminary Road at Heritage Lane/Fairbanks Avenue was notably difficult to make. Painted stop bars and signage indicate to eastbound and westbound drivers on Seminary Road to stop for pedestrians, and there is little to no observance of this direction, making it difficult to cross.

3.3 TRAFFIC VOLUMES

The analyses contained herein are based on the one AM and one PM hour during which the most traffic is in the study area. These hours are known as the “network peak hours” of traffic. For the purposes of this analysis, a network peak hour of traffic was identified based on the cumulative amount of traffic at all study area intersections within a single continuous 60-minute period. The network peak hours of the study area were identified as 7:30 AM to 8:30 AM and 4:45 to 5:45 PM. The AM and PM peak hour existing traffic volumes at the study area intersections are summarized in **Figure 3-1**. AM and PM peak hour existing pedestrian volumes at the study area intersections are summarized in **Figure 3-2**. Note that pedestrian volumes recorded at unmarked crossings are marked in red. Complete data collection sheets including turning movement counts and bicycle and pedestrian data, are provided in **Appendix A**.

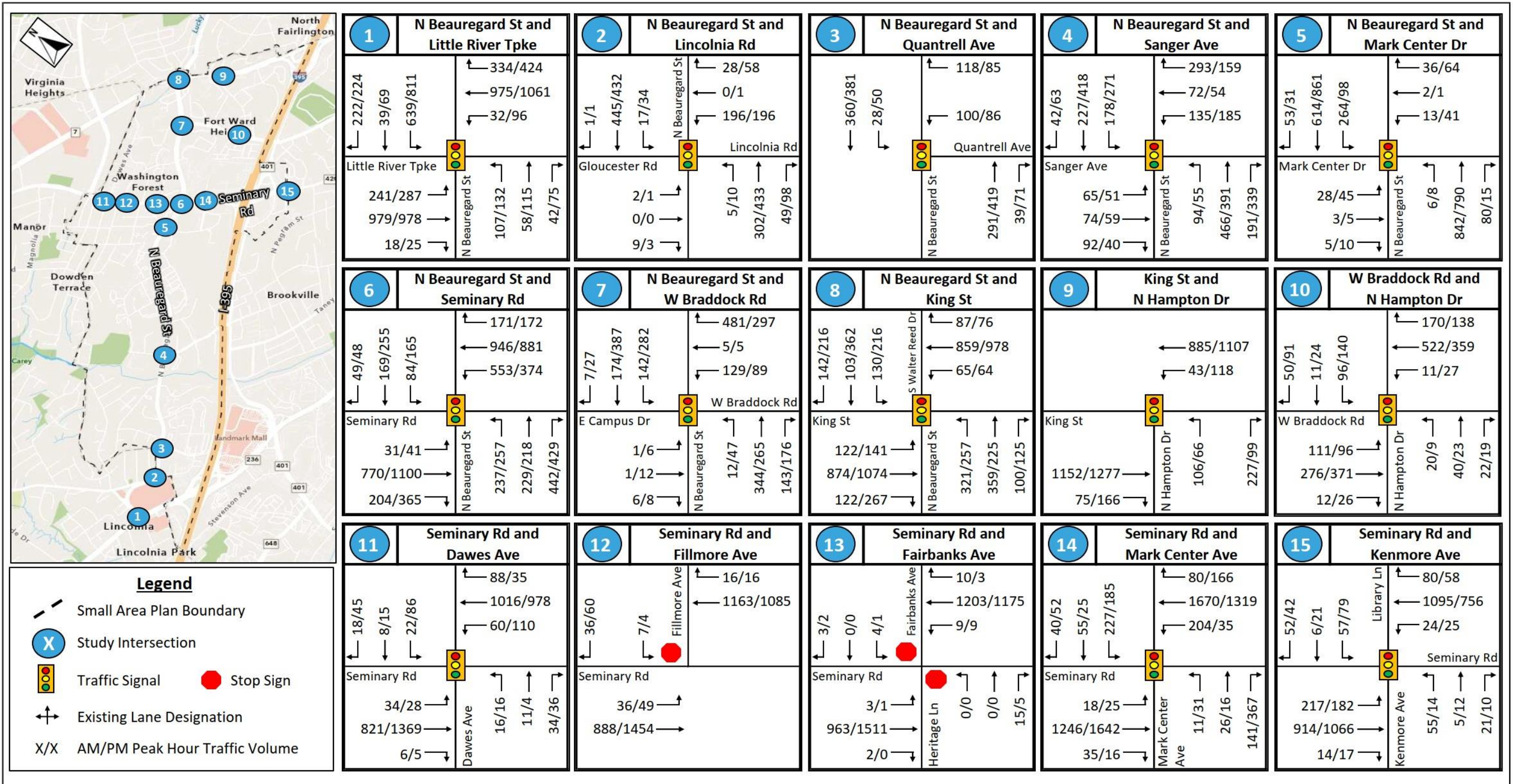


Figure 3-1: Existing 2022 Peak Hour Traffic Volumes

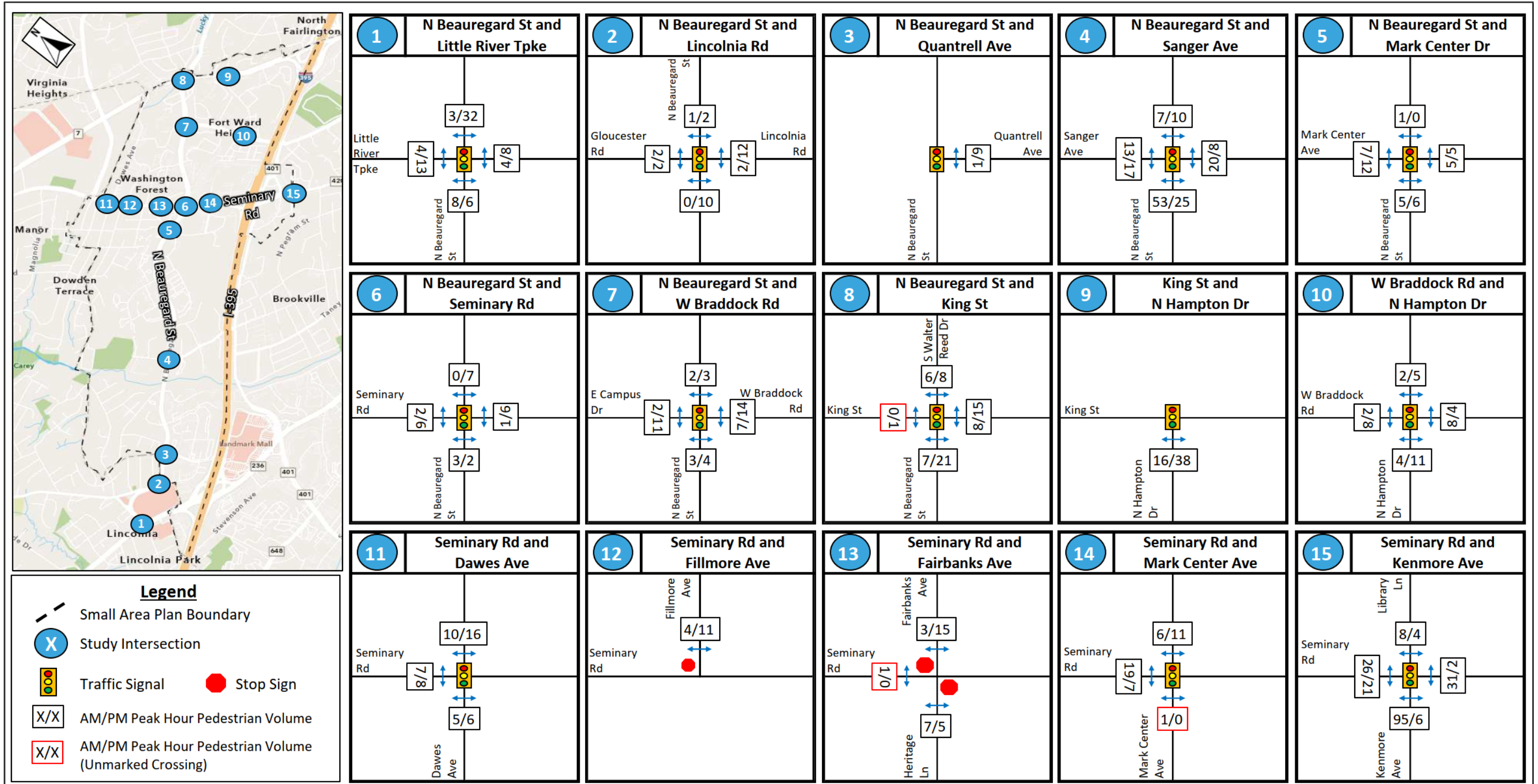


Figure 3-2: Existing 2022 Peak Hour Pedestrian Volumes

3.4 EXISTING INTERSECTION CAPACITY AND QUEUING ANALYSIS

ANALYSIS METHODOLOGY

Intersection capacity analyses were conducted using the existing AM and PM peak hour turning movement volumes at the study intersections. The capacity analyses were conducted using Synchro 11 software and based on methodologies contained in the Highway Capacity Manual, HCM 2000, for all intersections. HCM 2000 was used due to limitations of the HCM 6th Edition methodology in accommodating unique phasing sequences and specific lane configurations. This analysis methodology was selected to identify high-level impacts between analysis scenarios. Synchro 11-based 95th percentile queuing analysis results were also reported to help validate traffic results.

According to the HCM, capacity is defined as the maximum number of vehicles that can pass over a road segment or through an intersection within a fixed time duration. Operational conditions are described by a level of service (LOS), which is a qualitative measure that describes the operational conditions of an intersection or street and is an indicator of motorist perceptions within a traffic stream. The HCM defines six levels of service, LOS A through F, with A as the best and F as the worst. **Table 3-2** shows the level of service and delay per vehicle for signalized and unsignalized intersections.

Table 3-2: Level of Service and Ranges of Delay

Level of Service (LOS)	Delay per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	≤ 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Highway Capacity Manual, HCM 2000

Queue length is an indicator of congestion at both signalized and unsignalized intersections. The analysis of 95th percentile queue lengths represent the queue length with a five percent probability of being exceeded during the analysis.

The analysis of existing conditions was based on the existing peak hour turning movement volumes, lane designations, peak hour factors, and traffic control at the study intersections. HCM-based intersection capacity analysis and Synchro 11-based 95th percentile queuing analysis results are summarized in **Table 3-3**.

Existing conditions Synchro HCM reports are provided in **Appendix B**.

Table 3-3: 2022 Existing Conditions Capacity and Queuing Analysis Results

Intersection	Movement	Storage Length (ft)	2022 Existing Conditions			
			AM Peak Hour		PM Peak Hour	
			LOS (Delay)	95th Percentile Queue Length (ft)	LOS (Delay)	95th Percentile Queue Length (ft)
1. N Beauregard Street and Little River Turnpike (Signalized)						
Northbound (N Beauregard St)	L	135	F (101.4)	#210	F (170.9)	#358
	T	-	E (78.9)	120	F (119.9)	#285
	R	-	E (70.8)	83	E (79.6)	149
	Approach	-	F (88.9)		F (131.5)	
Southbound (N Beauregard St)	L	650*	E (74.6)	m367	F (106.1)	m#870
	LT		E (73.7)	m367	F (104.8)	m#877
	R	670*	E (60.4)	m77	E (56.9)	m166
	Approach	-	E (70.7)		F (95.6)	
Eastbound (Little River Tpk)	L	400	F (84.7)	194	F (122.7)	#306
	TR	680*	C (34.6)	577	D (48.0)	693
	Approach	-	D (44.4)		E (64.6)	
Westbound (Little River Tpk)	L	220	F (86.2)	80	F (116.3)	211
	T	335*	D (44.5)	635	D (54.3)	756
	R		B (12.9)	59	B (14.1)	249
	Approach	-	D (37.7)		D (47.3)	
Overall Intersection			D (50.9)		E (71.2)	
2. N Beauregard Street and Gloucester Road/Lincolnia Road (Signalized)						
Northbound (N Beauregard St)	L	210	B (10.0)	5	A (9.9)	9
	TR	850*	B (11.9)	83	B (13.5)	141
	Approach	-	B (11.8)		B (13.4)	
Southbound (N Beauregard St)	L	200	B (10.0)	11	B (10.2)	20
	TR	820*	B (12.2)	106	B (12.0)	113
	Approach	-	B (12.1)		B (11.9)	
Eastbound (Gloucester Rd)	LTR	-	B (11.4)	0	B (13.0)	0
	Approach	-	B (11.4)		B (13.0)	
Westbound (Lincolnia Rd)	LT	-	B (14.6)	113	B (17.1)	133
	R	60	B (11.4)	5	B (13.2)	21
	Approach	-	B (14.2)		B (16.2)	
Overall Intersection			B (12.4)		B (13.4)	
3. N Beauregard Street and Quantrell Avenue (Signalized)						
Northbound (N Beauregard St)	T	835*	A (3.2)	36	A (2.9)	52
	R	110	A (3.0)	8	A (2.6)	11
	Approach	-	A (3.2)		A (2.9)	
Southbound (N Beauregard St)	L	120	A (1.9)	9	A (3.6)	21
	T	835*	A (2.0)	33	A (3.7)	53
	Approach	-	A (2.0)		A (3.7)	
Westbound (Quantrell Ave)	L	-	D (35.5)	98	D (38.8)	89
	R	35	C (32.1)	46	C (34.1)	40
	Approach	-	C (33.6)		D (36.5)	
Overall Intersection			A (9.8)		A (8.4)	

Intersection	Movement	Storage Length (ft)	2022 Existing Conditions			
			AM Peak Hour		PM Peak Hour	
			LOS (Delay)	95th Percentile Queue Length (ft)	LOS (Delay)	95th Percentile Queue Length (ft)
4. N Beauregard Street and Sanger Ave (Signalized)						
Northbound (N Beauregard St)	L	190	C (24.5)	109	C (25.6)	59
	TR	870*	C (34.2)	403	D (41.9)	515
	Approach	-	C (33.0)		D (40.8)	
Southbound (N Beauregard St)	L	185	B (19.0)	177	D (50.1)	335
	TR	880*	C (24.5)	151	C (28.7)	267
	Approach	-	C (22.3)		D (36.4)	
Eastbound (Sanger Ave)	LTR	-	F (82.1)	190	E (73.7)	135
	Approach	-	F (82.1)		E (73.7)	
Westbound (Sanger Ave)	LT	-	F (157.1)	#458	F (92.2)	#502
	TR	-	F (99.6)	#556	D (36.1)	199
	Approach	-	F (123.4)		E (69.7)	
Overall Intersection			E (59.9)		D (47.1)	
5. N Beauregard Street and Mark Center Drive (Signalized)						
Northbound (N Beauregard St)	L	175	D (47.1)	18	E (65.8)	m27
	TR	675*	B (16.9)	323	A (4.5)	103
	Approach	-	B (17.1)		A (5.1)	
Southbound (N Beauregard St)	L	390	C (24.9)	114	F (85.5)	m80
	TR	645*	A (1.4)	78	A (4.2)	184
	Approach	-	A (8.0)		B (12.2)	
Eastbound (Mark Center Dr)	L	-	E (58.0)	53	D (54.7)	75
	TR	-	E (56.5)	19	D (52.6)	25
	Approach	-	E (57.7)		D (54.2)	
Westbound (Mark Center Dr)	LT	-	E (57.5)	34	D (54.8)	72
	R	-	C (28.2)	12	D (44.9)	34
	Approach	-	D (36.6)		D (48.9)	
Overall Intersection			B (14.0)		B (12.6)	
6. N Beauregard Street and Seminary Road (Signalized)						
Northbound (N Beauregard St)	L	190	E (69.1)	175	D (48.0)	145
	T	655*	F (82.5)	169	D (49.4)	124
	R	585	F (81.2)	515	D (40.5)	168
	Approach	-	E (78.4)		D (44.8)	
Southbound (N Beauregard St)	L	245	E (63.8)	138	E (59.3)	238
	TR	1240*	E (78.5)	152	E (58.6)	196
	Approach	-	E (74.4)		E (58.8)	
Eastbound (Seminary Rd)	L	125	D (53.2)	56	E (71.0)	m69
	TR	555*	C (29.7)	278	B (13.6)	109
	Approach	-	C (30.4)		B (15.1)	
Westbound (Seminary Rd)	L	350	C (30.8)	189	D (44.6)	158
	T	610*	A (6.0)	64	A (7.0)	57
	R	355	A (2.5)	0	A (2.7)	1
	Approach	-	B (13.8)		B (16.3)	
Overall Intersection			D (37.9)		C (26.5)	

Intersection	Movement	Storage Length (ft)	2022 Existing Conditions			
			AM Peak Hour		PM Peak Hour	
			LOS (Delay)	95th Percentile Queue Length (ft)	LOS (Delay)	95th Percentile Queue Length (ft)
7. N Beauregard Street and E Campus Drive/W Braddock Road (Signalized)						
Northbound (N Beauregard St)	L	85	E (65.5)	25	E (67.1)	93
	TR	1030*	B (14.7)	281	B (17.2)	254
	Approach	-	B (15.9)		C (22.0)	
Southbound (N Beauregard St)	L	200	D (51.5)	162	D (53.4)	215
	TR	700*	A (8.0)	77	A (7.1)	126
	Approach	-	C (27.1)		C (25.9)	
Eastbound (E Campus Dr)	L	125	E (63.4)	6	E (62.6)	20
	TR	-	E (63.4)	0	E (62.6)	18
	Approach	-	E (63.4)		E (62.6)	
Westbound (W Braddock Rd)	L	200	E (65.6)	174	E (62.2)	132
	LTR	-	E (55.5)	57	E (56.8)	50
	Approach	-	E (57.4)		E (57.9)	
Overall Intersection			D (36.3)		C (33.1)	
8. N Beauregard Street/S Walter Reed Drive and King Street (Signalized)						
Northbound (N Beauregard St)	L	420	E (75.7)	222	E (73.5)	178
	TR	530*	D (44.8)	233	E (58.7)	163
	Approach	-	E (57.5)		E (65.0)	
Southbound (S Walter Reed Dr)	L	205	E (55.6)	139	D (48.6)	226
	T	900*	D (46.4)	73	D (51.6)	217
	R	205	D (46.0)	52	D (49.0)	136
Approach	-	D (49.5)		D (50.1)		
Eastbound (King St)	L	290	C (33.9)	95	C (31.5)	114
	TR	520*	D (36.2)	505	D (45.8)	#731
	Approach	-	D (35.9)		D (44.5)	
Westbound (King St)	L	435	C (29.9)	57	D (38.0)	67
	TR	685*	C (34.8)	470	D (38.2)	530
	Approach	-	C (34.4)		D (38.1)	
Overall Intersection			D (42.1)		D (46.9)	
9. N Hampton Drive and King Street (Signalized)						
Northbound (N Hampton Dr)	L	300	E (58.9)	147	D (54.6)	95
	R	765*	D (48.8)	76	D (50.4)	52
	Approach	-	D (52.0)		D (52.1)	
Eastbound (King St)	TR	305*	A (8.9)	318	A (9.4)	392
	Approach	-	A (8.9)		A (9.4)	
Westbound (King St)	L	295	A (4.9)	15	A (6.6)	30
	T	440*	A (4.0)	132	A (3.5)	150
	Approach	-	A (4.0)		A (3.8)	
Overall Intersection			B (12.9)		A (9.5)	

Intersection	Movement	Storage Length (ft)	2022 Existing Conditions			
			AM Peak Hour		PM Peak Hour	
			LOS (Delay)	95th Percentile Queue Length (ft)	LOS (Delay)	95th Percentile Queue Length (ft)
10. N Hampton Drive and W Braddock Road (Signalized)						
Northbound (N Hampton Dr)	LT	-	D (36.5)	67	C (31.1)	43
	R	-	C (34.9)	0	C (30.5)	0
	Approach	-	D (36.1)		C (30.9)	
Southbound (N Hampton Dr)	LT	-	D (47.2)	112	D (48.6)	170
	R	40	D (35.0)	0	C (30.8)	32
	Approach	-	D (43.3)		D (42.2)	
Eastbound (W Braddock Rd)	L	185	A (4.4)	41	A (6.6)	40
	TR	-	A (6.6)	67	A (9.7)	101
	Approach	-	A (6.0)		A (9.1)	
Westbound (W Braddock Rd)	L	185	A (7.7)	8	A (8.2)	15
	T	-	A (9.8)	133	B (10.7)	98
	R	185	A (8.9)	33	B (10.1)	30
	Approach	-	A (9.6)		B (10.4)	
Overall Intersection			B (14.1)		B (16.8)	
11. Seminary Road and Dawes Avenue (Signalized)						
Northbound (Dawes Ave)	LTR	-	E (60.9)	62	D (54.8)	55
	Approach	-	E (60.9)		D (54.8)	
Southbound (Dawes Ave)	LT	-	E (61.4)	53	E (64.9)	144
	R	-	E (59.5)	0	D (54.1)	7
	Approach	-	E (60.7)		E (61.6)	
Eastbound (Seminary Rd)	L	280	A (4.3)	21	A (6.6)	18
	TR	570*	A (6.1)	256	B (13.2)	581
	Approach	-	A (6.1)		B (13.1)	
Westbound (Seminary Rd)	L	105	A (0.6)	6	C (23.6)	118
	TR	425*	A (1.2)	37	A (6.3)	324
	Approach	-	A (1.2)		A (8.0)	
Overall Intersection			A (6.2)		B (14.5)	
12. Seminary Road and Fillmore Avenue (Unsignalized)						
Southbound (Fillmore Ave)	LR	-	B (14.9)	9	B (12.3)	10
	Approach	-	B (14.9)		B (12.3)	
Eastbound (Seminary Rd)	LT	440*	A (0.9)	6	A (0.8)	7
	Approach	-	A (0.9)		A (0.8)	
Westbound (Seminary Rd)	TR	445*	A (0.0)	0	A (0.0)	0
	Approach	-	A (0.0)		A (0.0)	
13. Seminary Road and Heritage Lane/Fairbanks Avenue (Unsignalized)						
Northbound (Heritage Ln)	LTR	-	B (10.2)	2	A (9.6)	0
	Approach	-	B (10.2)		A (9.6)	
Southbound (Fairbanks Ave)	LTR	-	C (24.2)	3	C (18.3)	1
	Approach	-	C (24.2)		C (18.3)	
Eastbound (Seminary Rd)	LTR	445*	A (0.1)	0	A (0.0)	0
	Approach	-	A (0.1)		A (0.0)	
Westbound (Seminary Rd)	LTR	560*	A (0.2)	1	A (0.3)	2
	Approach	-	A (0.2)		A (0.3)	

Intersection	Movement	Storage Length (ft)	2022 Existing Conditions			
			AM Peak Hour		PM Peak Hour	
			LOS (Delay)	95th Percentile Queue Length (ft)	LOS (Delay)	95th Percentile Queue Length (ft)
14. Seminary Road and Mark Center Avenue (Signalized)						
Northbound (Mark Center Ave)	LT	230*	E (60.6)	70	E (59.9)	84
	R		D (39.1)	60	D (51.0)	173
	<i>Approach</i>	-	<i>D (43.6)</i>		<i>D (52.0)</i>	
Southbound (Mark Center Ave)	L	100	D (49.4)	149	D (54.0)	135
	LTR	-	D (48.3)	110	D (52.3)	89
	<i>Approach</i>	-	<i>D (48.7)</i>		<i>D (52.9)</i>	
Eastbound (Seminary Rd)	L	205	F (80.9)	m35	E (72.0)	m42
	TR	615*	C (24.0)	396	B (14.6)	356
	<i>Approach</i>	-	<i>C (24.8)</i>		<i>B (15.5)</i>	
Westbound (Seminary Rd)	L	1055*	D (52.0)	262	E (57.2)	68
	T	975*	C (25.0)	578	B (14.5)	395
	R	255	B (12.8)	m23	B (14.2)	64
	<i>Approach</i>	-	<i>C (27.3)</i>		<i>B (15.5)</i>	
Overall Intersection			C (29.1)		C (21.9)	
15. Seminary Road and Kenmore Avenue/Library Lane (Signalized)						
Northbound (Kenmore Ave)	LTR	-	F (81.1)	131	D (44.1)	48
	<i>Approach</i>	-	<i>F (81.1)</i>		<i>D (44.1)</i>	
Southbound (Library Ln)	LT	-	E (71.8)	115	E (55.0)	127
	R	70	E (61.3)	95	D (44.9)	62
	<i>Approach</i>	-	<i>E (67.1)</i>		<i>D (52.0)</i>	
Eastbound (Seminary Rd)	L	215	B (16.8)	222	A (3.8)	59
	TR	230*	B (12.8)	363	A (7.0)	164
	<i>Approach</i>	-	<i>B (13.6)</i>		<i>A (6.5)</i>	
Westbound (Seminary Rd)	L	60	A (7.8)	10	A (7.0)	12
	TR	405*	B (12.2)	267	A (9.9)	154
	<i>Approach</i>	-	<i>B (12.1)</i>		<i>A (9.8)</i>	
Overall Intersection			B (17.5)		B (11.2)	

95th percentile volume exceeds capacity, queue may be longer. Queue shown in maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

2022 EXISTING CONDITIONS INTERSECTION CAPACITY ANALYSIS RESULTS

A graphical summary of the existing conditions intersection capacity analysis results is shown in **Figure 3-3**. The AADT of each study area roadway and the delay at each study area intersection were assigned to respective color scales to provide a high-level graphical depiction of the existing conditions within the study area. Note that HCM methodology precludes unsignalized intersections from delay analysis at the overall intersection level. As such, the locations of the two unsignalized intersections are identified in **Figure 3-3**, the overall average delay at these intersections is not indicated.

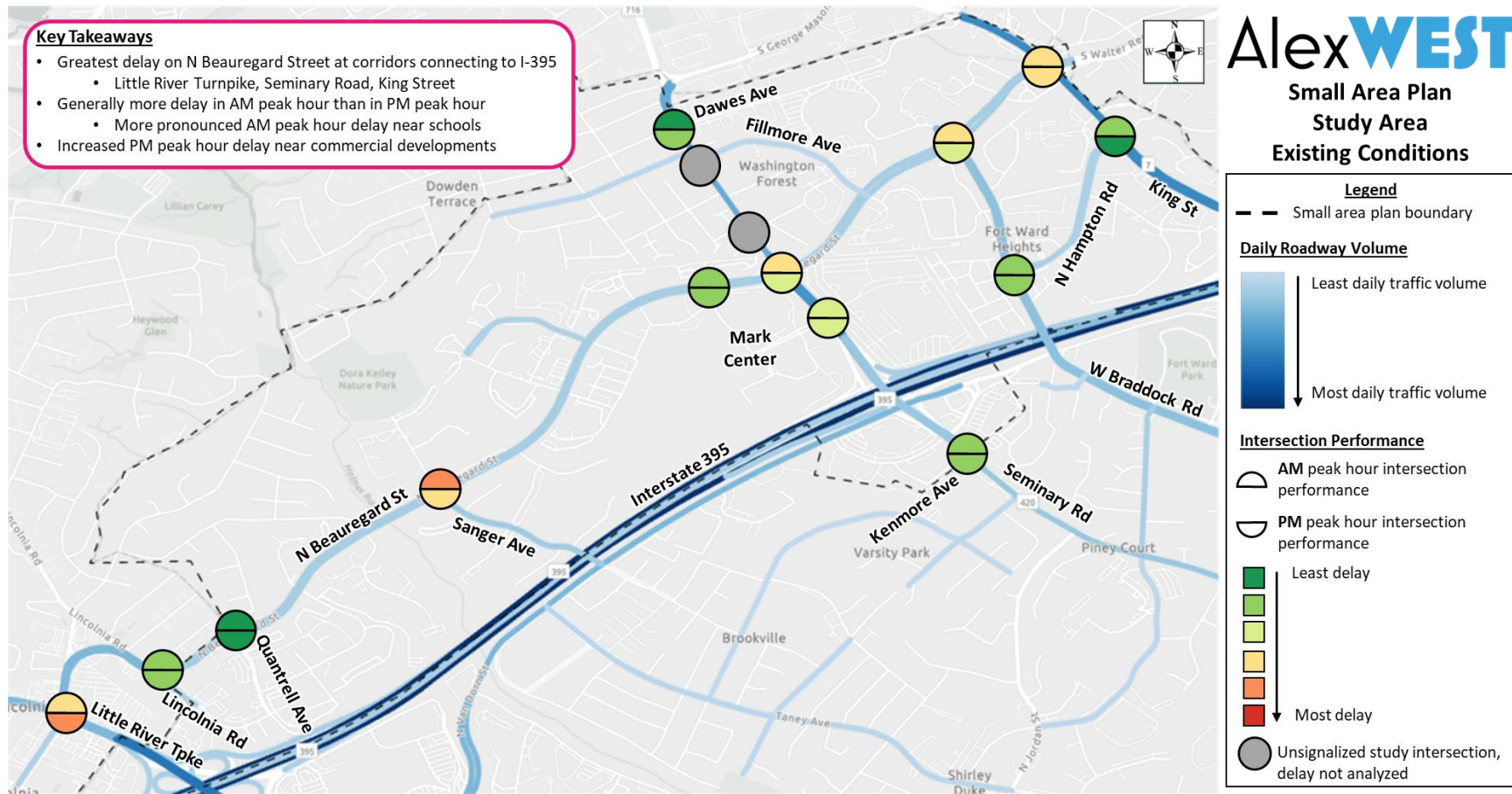


Figure 3-3: Existing Conditions Summary Graphic

The capacity analysis results show that under 2022 existing conditions, most signalized intersections are anticipated to operate at overall intersection LOS D or better in the AM and PM peak hours, with the following exceptions:

- N Beauregard Street and Little River Turnpike (LOS E in the PM peak hour)
- N Beauregard Street and Sanger Avenue (LOS E in the AM peak hour)

Most intersection approaches operate at LOS D or better in the AM and PM peak hours, except the following:

- N Beauregard Street and Little River Turnpike
 - Northbound approach (LOS F in the AM and PM peak hours)
 - Southbound approach (LOS E in the AM peak hour, LOS F in the PM peak hour)
 - Eastbound approach (LOS E in the PM peak hour)
- N Beauregard Street and Sanger Avenue
 - Eastbound approach (LOS F in the AM peak hour, LOS E in the PM peak hour)
 - Westbound approach (LOS F in the AM peak hour, LOS E in the PM peak hour)
- N Beauregard Street and Mark Center Drive
 - Eastbound approach (LOS E in the AM peak hour)
- N Beauregard Street and Seminary Road
 - Northbound approach (LOS E in the AM peak hour)
 - Southbound approach (LOS E in the AM and PM peak hours)
- N Beauregard Street and E Campus Drive/W Braddock Road
 - Eastbound approach (LOS E in the AM and PM peak hour)
 - Westbound approach (LOS E in the AM and PM peak hour)
- N Beauregard Street/S Walter Reed Drive and King Street
 - Northbound approach (LOS E in the AM and PM peak hours)
- Seminary Road and Dawes Avenue
 - Northbound approach (LOS E in the AM peak hour)
 - Southbound approach (LOS E in the AM and PM peak hours)
- Seminary Road and Kenmore Avenue/Library Lane
 - Northbound approach (LOS F in the AM peak hour)
 - Southbound approach (LOS E in the AM peak hour)

Most movements operate at LOS D or better in the AM and PM peak hours, except the following:

- N Beauregard Street and Little River Turnpike
 - Northbound left (LOS F in the AM and PM peak hours)
 - Northbound through (LOS E in the AM peak hour, LOS F in the PM peak hour)
 - Northbound right (LOS E in the AM and PM peak hours)
 - Southbound left (LOS E in the AM peak hour, LOS F in the PM peak hour)
 - Southbound left-through (LOS E in the AM peak hour, LOS F in the PM peak hour)
 - Southbound right (LOS E in the AM and PM peak hours)
 - Eastbound left (LOS F in the AM and PM peak hours)
 - Westbound left (LOS F in the AM and PM peak hours)
- N Beauregard Street and Sanger Avenue
 - Eastbound left-through-right (LOS F in the AM peak hour, LOS E in the PM peak hour)
 - Westbound left-through (LOS F in the AM and PM peak hours)
 - Westbound through-right (LOS F in the AM peak hour)

- N Beauregard Street and Mark Center Drive
 - Northbound left (LOS E in the PM peak hour)
 - Southbound left (LOS F in the PM peak hour)
 - Eastbound left (LOS E in the AM peak hour)
 - Eastbound through-right (LOS E in the AM peak hour)
 - Westbound left-through (LOS E in the AM peak hour)
- N Beauregard Street and Seminary Road
 - Northbound left (LOS E in the AM peak hour)
 - Northbound through (LOS F in the AM peak hour)
 - Northbound right (LOS F in the AM peak hour)
 - Southbound left (LOS E in the AM and PM peak hours)
 - Southbound through-right (LOS E in the AM and PM peak hours)
 - Eastbound left (LOS E in the PM peak hour)
- N Beauregard Street and E Campus Drive/W Braddock Road
 - Northbound left (LOS E in the AM and PM peak hours)
 - Eastbound left (LOS E in the AM and PM peak hours)
 - Eastbound through-right (LOS E in the AM and PM peak hours)
 - Westbound left (LOS E in the AM and PM peak hours)
 - Westbound left-through-right (LOS E in the AM and PM peak hours)
- N Beauregard Street/S Walter Reed Drive and King Street
 - Northbound left (LOS E in the AM and PM peak hours)
 - Northbound through-right (LOS E in the PM peak hour)
 - Southbound left (LOS E in the AM peak hour)
- N Hampton Drive and King Street
 - Northbound left (LOS E in the AM peak hour)
- Seminary Road and Dawes Avenue
 - Northbound left-through-right (LOS E in the AM peak hour)
 - Southbound left-through (LOS E in the AM and PM peak hours)
 - Southbound right (LOS E in the AM peak hour)
- Seminary Road and Mark Center Avenue
 - Northbound left-through (LOS E in the AM and PM peak hours)
 - Eastbound left (LOS E in the AM and PM peak hours)
 - Westbound left (LOS E in the PM peak hour)
- Seminary Road and Kenmore Avenue/Library Lane
 - Northbound left-through-right (LOS F in the AM peak hour)
 - Southbound left-through (LOS E in the AM and PM peak hours)
 - Southbound right (LOS E in the AM peak hour)

2022 EXISTING CONDITIONS QUEUEING ANALYSIS RESULTS

Queueing analyses were conducted using Synchro methodology to determine the 95th percentile queues for each vehicle movement. The 95th percentile queues are summarized in **Table 3-3**. 95th percentile queue lengths that exceed their available storage capacity under 2022 existing conditions include the following:

- N Beauregard Street and Little River Turnpike
 - Northbound left (storage length exceeded in the AM and PM peak hours)

- N Beauregard Street and Quantrell Avenue
 - Westbound right (storage length exceeded in the AM and PM peak hours)
- N Beauregard Street and Sanger Avenue
 - Southbound left (storage length exceeded in the PM peak hour)
- N Beauregard Street and E Campus Drive/W Braddock Road
 - Northbound left (storage length exceeded in the PM peak hour)
 - Southbound left (storage length exceeded in the PM peak hour)
- N Beauregard Street/S Walter Reed Drive and King Street
 - Southbound left (storage length exceeded in the PM peak hour)
- Seminary Road and Dawes Avenue
 - Westbound left (storage length exceeded in the PM peak hour)
- Seminary Road and Mark Center Avenue
 - Southbound left (storage length exceeded in the AM and PM peak hours)
- Seminary Road and Kenmore Avenue
 - Southbound right (storage length exceeded in the AM peak hour)
 - Eastbound left (storage length exceeded in the AM peak hour)

The following movements have 95th percentile queue lengths that exceed the effective storage length of adjacent turn lanes under 2022 existing conditions, effectively blocking access of turning vehicles during queueing conditions:

- N Beauregard Street and Little River Turnpike
 - Northbound through (blocks access to left turn lane in the PM peak hour)
 - Southbound left-through (blocks access to right turn lane in the PM peak hour)
 - Eastbound through-right (blocks access to left turn lane in the AM and PM peak hours)
 - Westbound through (blocks access to left turn lane in the AM and PM peak hours)
- N Beauregard Street and Gloucester Road/Lincolnia Road
 - Westbound left-through (blocks access to right turn lane in the AM and PM peak hours)
- N Beauregard Street and Quantrell Avenue
 - Westbound left (blocks access to right turn lane in the AM and PM peak hours)
- N Beauregard Street and Sanger Avenue
 - Northbound through-right (blocks access to left turn lane in the AM and PM peak hours)
 - Southbound through-right (blocks access to left turn lane in the PM peak hour)
- N Beauregard Street and Mark Center Drive
 - Northbound through-right (blocks access to left turn lane in the AM peak hour)
- N Beauregard Street and Seminary Road
 - Eastbound through-right (blocks access to left turn lane in the AM peak hour)
- N Beauregard Street and E Campus Drive/W Braddock Road
 - Northbound through-right (blocks access to left turn lane in the AM and PM peak hours)
- N Beauregard Street/S Walter Reed Drive and King Street
 - Southbound through (blocks access to left and right turn lanes in the PM peak hour)
 - Eastbound through-right (blocks access to left turn lane in the AM and PM peak hours)
 - Westbound through-right (blocks access to left turn lane in the AM and PM peak hours)
- N Hampton Drive and W Braddock Road
 - Southbound left-through (blocks access to right turn lane in the AM and PM peak hours)
- Seminary Road and Dawes Avenue
 - Eastbound through-right (blocks access to left turn lane in the PM peak hour)
 - Westbound through-right (blocks access to left turn lane in the PM peak hour)

- Seminary Road and Mark Center Avenue
 - Southbound left-through-right (blocks access to left turn lane in the AM peak hour)
 - Eastbound through-right (blocks access to left turn lane in the AM and PM peak hours)
 - Westbound through (blocks access to right turn lane in the AM and PM peak hours)
- Seminary Road and Kenmore Avenue/Library Lane
 - Southbound left-through (blocks access to right turn lane in the AM and PM peak hours)
 - Eastbound through-right (blocks access to left turn lane in the AM peak hour)
 - Westbound through-right (blocks access to left turn lane in the AM and PM peak hours)

The following movements have 95th percentile queue lengths which extend beyond the available “block length,” the distance to the next upstream intersection, under 2022 existing conditions:

- N Beauregard Street and Little River Turnpike
 - Southbound left (block length exceeded in the PM peak hour)
 - Southbound left-through (block length exceeded in the PM peak hour)
 - Eastbound through-right (block length exceeded in the PM peak hour)
 - Westbound through (block length exceeded in the AM and PM peak hours)
- N Beauregard Street/S Walter Reed Drive and King Street
 - Eastbound through-right (block length exceeded in the PM peak hour)
- N Hampton Drive and King Street
 - Eastbound through-right (block length exceeded in the AM and PM peak hours)
- Seminary Road and Dawes Avenue
 - Eastbound through-right (block length exceeded in the PM peak hour)
- Seminary Road and Kenmore Avenue/Library Lane
 - Eastbound through-right (block length exceeded in the AM peak hour)

3.5 EXISTING TRAFFIC OPERATIONS SUMMARY

The Synchro traffic analyses are generally consistent with observed field conditions. On the N Beauregard Street corridor, the greatest operational challenges were observed in locations which provide access to I-395, namely, Little River Turnpike, Seminary Road, and King Street. These locations, which experience high demand from both the N Beauregard Street corridor and the connecting streets providing access to I-395, were shown to have significant delays along mainline northbound and southbound N Beauregard Street. Relatively few operational challenges were observed on the rest of the N Beauregard Street corridor, except in locations directly adjacent to schools or high-density residential developments. In these locations, mainline turning movements and minor street approaches were subject to greater delays compared to mainline northbound and southbound through movements on N Beauregard Street.

On the Seminary Road corridor, delays were also primarily experienced by mainline turning vehicles and vehicles on minor street approaches to Seminary Road. West of N Beauregard Street, where the land use is primarily low-density residential, the unsignalized intersections operated with little delay, even to minor street approaches. The signalized intersection of Seminary Road and Dawes Avenue, which is adjacent to commercial and industrial uses, experienced moderate minor street delays. East of N Beauregard Street, delays were also primarily experienced by mainline turning vehicles and vehicles on the minor street approaches to Seminary Road.

Generally, AM peak hour delays were slightly greater than PM peak hour delays, and more significantly so in areas adjacent to schools. PM peak hour delays than AM peak hour delays were greater in areas adjacent to commercial uses, as recorded in field observations and indicated by traffic analysis.