

# FAIRFAX COUNTY PARKWAY & FRANCONIA-SPRINGFIELD PARKWAY CORRIDOR STUDY

## EXISTING TRANSPORTATION AND SAFETY CONDITIONS TECHNICAL REPORT

Prepared for



Prepared by



FINAL | JUNE 2017



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## EXECUTIVE SUMMARY

Fairfax County Parkway (FCP) and Franconia-Springfield Parkway (FSP) are major arterial roadways that facilitate travel across Fairfax County, providing access to residential communities and major activity centers. The two roadways also connect the region to other major roadways, including Route 7, the Dulles Toll Road, I-66, Route 123, I-95, and Richmond Highway as well as the Metrorail system including the Franconia-Springfield Metrorail Station and the future Metrorail stations along the Silver Line in Reston. The primary purpose of this corridor study is to assess short-term multimodal improvements that can be implemented along Fairfax County Parkway and Franconia-Springfield Parkway. This project also provides a foundation of existing conditions that can be utilized for the second phase of the study—the corridor visioning and developing future alternatives to update the Comprehensive Plan.

## EXISTING CONDITIONS ASSESSMENT

The study accomplished the goal of identifying short-term improvements through an existing conditions assessment consisting of field inventories, analysis of crash data, traffic operations analyses, and public outreach. Below are some of the primary outcomes of the existing conditions assessment.

### Field Observations and Intersection Inventories

A coordinated effort was undertaken to observe AM and PM peak period operations along the entire 31-mile corridor of Fairfax County Parkway during the month of October 2014. A separate effort was completed on October 8, 2015 for the 3-mile Franconia-Springfield Parkway spur. The purpose of the observations was to understand typical operations at study area intersections and along the corridor. This helped with the development of preliminary short-term recommended improvements and helped validate the results of the operational analyses. In addition, intersection inventories were completed around the same time periods to document existing geometry, pedestrian accommodations, intersection control, and signal operations. Using the data collected, a preliminary list of issues was developed. The vast majority of the issues identified were intersection specific, but a few common themes were identified along the corridor. The most commonly identified issues include the following:

- Recurring congestion and long queuing at several locations
- Existing curb ramps are non-compliant with Americans with Disabilities Act (ADA) guidelines
- No detectable warning surface is provided at the base of the ramp or edge of the shared-use path
- Inconsistent signage and markings are applied for channelized right-turn lanes with pedestrian crossing conflicts
- Inaccessible pushbuttons at signalized pedestrian crosswalks
- Poorly defined continuity in the trail network
- Lack of pedestrian accommodations at signed bus stop locations (i.e. pedestrian bus stop pad)

### Crash Data Analysis

An analysis of recorded crash data was completed to evaluate safety and identify crash patterns along the mainline, interchange on- and off-ramps, and intersections within the study corridors. Data for the Fairfax County Parkway corridor were evaluated for the period between January 1, 2010 and December 31, 2013. For the Franconia-Springfield Parkway corridor, the data set was expanded to include the period between January 1, 2010 and December 31, 2014, given the timing of the crash analysis of this corridor. The analysis resulted in the identification of eight half-mile hot-spot corridor segments and six hot spot intersections. The findings of the review helped guide the identification of issues and associated improvement recommended improvements. Given the information obtained from the crash analysis, a field safety review was completed to evaluate potential causes for the crash patterns

identified. A number of common issues were identified during the field safety review, although many locations warranted different countermeasures. The most frequent safety issues identified during the review included the following:

- Inadequate advance intersection signage (guidance and warning)
- Limited sight distance due to grade, roadside structure, or vegetation
- Difficult weaving segments caused by high volume interchanges
- Inconsistent roadway signage and pavement markings
- Large intersection footprints hindering signal visibility

A total of seven fatal crashes occurred along Fairfax County Parkway and three occurred along Franconia-Springfield Parkway. Of these crashes, only three were not attributed to impaired driving, medical distress, or reckless behavior. Based on these factors of the fatal crashes and the isolation of the ten crashes along the corridor, specific improvements were not identified to mitigate these crashes.

### Traffic Operations Analysis

VISUM software was used as an initial tool in the traffic operations analysis to develop the study area transportation network. Basic geometry and signal operations parameters were coded into the model. VISUM also served as a tool to develop an origin-destination (O-D) matrix, which allowed for travel routes to be assigned through the study network. Building on the VISUM network and associated O-D matrix, traffic simulation analysis was completed using VISSIM software, which helped identify and confirm bottleneck locations that have significant reduction in average speeds and extended queues. Some of the crossing streets also experience significant delays and queuing impact. The primary operational issues identified consisted of mainline congestion and queue spillback at the following locations:

- Sunrise Valley Drive to north of the Dulles Toll Road interchange
- Popes Head Road to Route 29
- Sydenstricker Road interchange through Huntsman Boulevard
- Richmond Highway

In addition to mainline operational issues, side-street movements were determined to experience congestion and queue spillback at the following intersections:

- Sunrise Valley Drive
- West Ox Road
- Franklin Farm Road
- Rugby Road
- Popes Head Road

### Public Outreach

The public involvement process undertaken as part of this study afforded the users of the Parkways an opportunity to learn about the project, review the outcome of planning efforts, and provide insight on corridor issues. During the first series of public meetings in June 2016, preliminary short-term improvements were presented based on the outcome of the field inventories and crash analysis. Based on the feedback provided, the list of short-term improvements was updated and shared at the second series of public meetings in November 2016. The updated list also included new short-term improvements identified based on the outcome of the traffic operations analysis.

Several overarching corridor issues were identified during the public meetings. The primary issues identified consisted of the following:

- Congestion at northern intersections along FCP (Sunrise Valley Drive to Spring Street)
- Difficult crossings along the FCP Trail (Route 50, Sunrise Valley Drive, Dulles Toll Road, Spring Street)
- Gaps in the existing FCP Trail (I-66, Route 123, Rolling Road to I-95) and FCP Trail wayfinding
- Overhead lighting (intersections, FCP Trail, overhead guide signs)
- Traffic signal right-turn on red conflicts with trail users
- Lack of regular maintenance of the FCP Trail

## SUMMARY OF SHORT-TERM IMPROVEMENTS

Following the completion of the public outreach efforts in November 2016, the short-term improvements were finalized. The goal of the study was not only to identify improvements, but to present improvements that were implementable considering time and cost. More than 350 short-term improvements were identified; however, not all improvements were recommended for implementation. Nearly 90 percent of the improvements fell into one of two main categories:

1. **Existing Program Funding Opportunity** – implement as part of annual programmatic budgets for a variety of “routine” improvements and maintenance (e.g. bus stops, pavement markings, signage, signal timing, signal phasing)
2. **Capital Improvement Project** – projects that don’t fall under the purview of the existing VDOT programmatic improvements, such as curb modifications, localized sidewalk/trail improvements, and intersection enhancements.

The remaining 10 percent of short-term improvements were not recommended for further consideration for one of two reasons. Either they were being accomplished through an ongoing study, design, or construction effort (e.g. I-66 Corridor Improvements Project), or they were deemed not to be feasible or provided marginal benefit to operations and safety.

The short-term improvements could also be classified under a handful of project types, including the following:

1. **Corridor-Wide Improvements** – Some of the recurring recommended improvements made along the Parkways could be applied to the corridor, including improvements such as consistent treatment for trail crossings, consistent notification of downstream intersections, installation of high visibility backplates at signalized intersections, and a corridor-wide street light study.
2. **Targeted Trail Crossing Improvements** – improvements to trail crossings with high traffic volume and speeds, namely the northbound ramp from FCP to Sunset Hills Road, the eastbound on-ramp to the Dulles Toll Road, and the westbound to northbound off-ramp from Route 50.
3. **Geometric and Operational Improvements** – nearly a dozen locations included improvements to intersection geometry and/or operations, many of which were congested locations with limited right-of-way. These improvements were screened using Synchro software, with a subset being evaluated further using VISSIM software to better understand the potential benefit of the improvement given the constrained, oversaturated operating conditions of the existing intersection.

Planning level cost estimates were developed for the programmatic and capital improvement short-term improvements. 2017 planning level cost estimates were derived from two sources:

1. VDOT Transportation and Mobility Planning Division (TMPD) Statewide Planning Level Cost Estimates tool
2. Compilation of pricing information from the Fairfax County Department of Public Works Environmental Services Land Development Services 2016 Comprehensive Unit Price Schedule, the latest VDOT district averages for the NOVA district, and costs for previous projects completed in Fairfax County

Costs provided in the VDOT TMPD tool are presented as a “low” and a “high” cost for major construction activities such as a turn lane extension or traffic signal modification. The costs developed using the other resources mentioned above were designated as the “low” estimate, and the “high” estimate was assumed to be 120 percent of the “low” estimate. **Table E1** provides an overall summary of the planning level cost estimate to implement the programmatic and capital improvement project short-term improvements.

**Table E1: Summary of Cost Estimates Based on Type of Improvement**

| Type of Improvement              | Number of Improvements | “Low Cost”          | “High” Cost         |
|----------------------------------|------------------------|---------------------|---------------------|
| Safety                           | 52                     | \$2,040,000         | \$2,510,000         |
| Operations                       | 34                     | \$15,620,000        | \$25,330,000        |
| Safety and Operations            | 12                     | \$4,380,000         | \$8,380,000         |
| Bike/Ped                         | 135                    | \$4,520,000         | \$6,230,000         |
| Bike/Ped and Safety              | 69                     | \$3,890,000         | \$6,600,000         |
| Bike/Ped and Operations          | 1                      | \$1,000             | \$2,000             |
| Safety, Operations, and Bike/Ped | 1                      | \$520,000           | \$910,000           |
| <b>TOTAL</b>                     | <b>304</b>             | <b>\$30,981,000</b> | <b>\$49,962,000</b> |

An interactive PDF provides a consolidated summary of the issues as well as the recommended improvements identified as part of this study. Improvements are noted as either programmatic or CIP projects. In addition, cost estimates are provided for the implementation of all improvements identified at each location. The interactive PDF can be found in **Appendix I**.

## CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this study is to assess existing conditions and develop short-term multimodal improvements that can be implemented along the Parkways to address safety and operational issues. The recommended improvements were developed by gathering information from field observations, crash analyses, operational analyses, and public input. The outcome of this process is a comprehensive list of recommended improvements and associated planning level cost estimates, which are summarized in **Appendix I** and **Appendix L**, respectively. The total planning level cost of the improvements is estimated to range between \$30,981,000 and \$49,962,000.

The crash analyses demonstrate that the corridor generally has a lower crash rate than the statewide average for a similar type of facility. This is to be expected given the design of the roadway according to

more current guidelines and standards. The bulk of the safety improvements identified through this project are relatively low-cost solutions, including high visibility signal backplates, warning signs, guide signs, and driver feedback information signs. The highest cost improvements identified were associated with geometric modifications at intersections to address queue spillback, which could influence the rate of rear-end collisions.

While the overall study area has a low crash rate, there are many challenges for pedestrians and bicyclists along the trail and the crossings. The majority (more than two-thirds) of the recommended improvements will enhance safety for trail users.

Initial field observations at the onset of the study provided an indication of areas along the corridor that experience peak period congestion. This information was used to corroborate the results of the operational analyses, which demonstrated congested operations along several segments of the corridor, including the Dulles Toll Road and Sunrise Valley Drive intersections, Popes Head Road, the Sydenstricker Road interchange, and Richmond Highway. Considering the results of the analyses, local intersection mitigation solutions were identified where improvement projects have not already been programmed for planning, design, or construction. The results of detailed simulation analyses of the locations identified indicates that measurable benefits can be expected in terms of delay, travel time, and queue reductions.

It is recommended that the improvements identified in **Appendix I** be carried forward for implementation as funding resources become available. The categorization of improvements is intended to assist with the planning, prioritization, and identification of funding mechanisms to implement these improvements. As mentioned in **Chapter 7**, it is expected that capital improvement projects could require a longer duration to realize implementation of the improvement given the need for planning, design, and potential right-of-way acquisition. It is recommended that future planning, design, and construction projects that impact the study corridor consider the improvements identified, and where possible, include the implementation of the improvements as part of the project. Improvements should also be coordinated with the ongoing Fairfax County Parkway/Franconia-Springfield Parkway Alternatives Analysis and Long-Term Planning Study to confirm compatibility with any updates to the Comprehensive Transportation Plan Map.

# 1 INTRODUCTION

## BACKGROUND

The first segment of the Fairfax County Parkway ([FCP] originally Route 7100 and redesignated as State Route 286, FCP) opened in 1987. FCP has been expanded and improved several times since the 1980s, ultimately connecting Richmond Highway (Route 1) in the south to Leesburg Pike (State Route 7) in the north to provide a generally north-south arterial for the county. Functioning as an east-west spur of Fairfax County Parkway, Franconia-Springfield Parkway ([FSP] originally Route 7900 and redesignated as State Route 289, FSP) was initially constructed in 1989 approximately one mile east of Rolling Road. The entire 3-mile roadway between Rolling Road/Fairfax County Parkway and Beulah Street was completed in 1992.

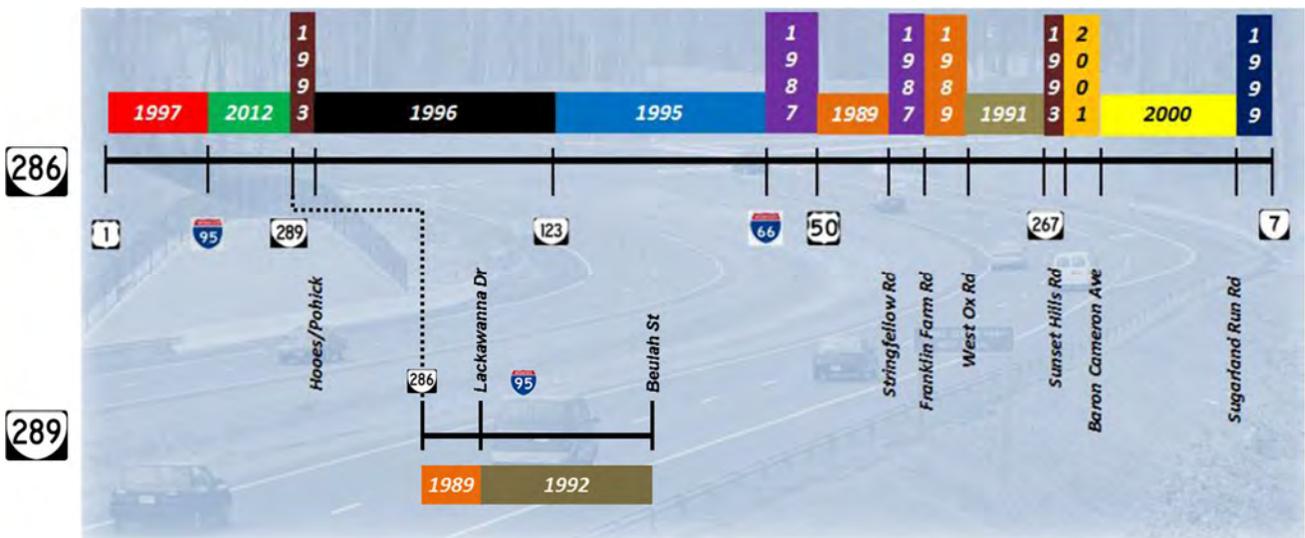


Exhibit 1: Opening year of various segments along FCP

Currently, Fairfax County Parkway includes 17 grade separated interchanges, 36 mainline signalized intersections, and 18 mainline unsignalized intersections. In addition, Franconia-Springfield Parkway includes three grade separated interchanges, three mainline signalized intersections, and one mainline unsignalized intersection.

In August 2013, the Fairfax County Board of Supervisors submitted a request to the Virginia Department of Transportation (VDOT) for the development of a vision for Fairfax County Parkway and Franconia-Springfield Parkway along with a corridor improvement study. The board’s objective was to consider the future of FCP and FSP, its role in the county and region’s transportation system, and how high-occupancy toll (HOT)/high-occupancy vehicle (HOV) including transit lanes or transit can move more people more efficiently through the corridor. As a result of the study, the county board intends to update priorities and potentially modify the county Comprehensive Plan. Since August 2013, the approach to evaluating FCP and FSP has evolved. This report summarizes the existing conditions assessment and identification of short-term multimodal improvements, a joint effort completed by VDOT and the Fairfax County Department of Transportation (FCDOT). The FCP and FSP long-term study, renamed the Fairfax County Parkway/Franconia-Springfield Parkway Alternatives Analysis and Long-Term Planning Study, will consist of future travel forecasts, alternatives development, and public

engagement in support of identifying a long-term vision for the corridor. This project is being conducted by FCDOT and was initiated in the spring of 2017.

## PURPOSE

This study focuses on assessing existing conditions and providing recommendations for short-term multimodal improvements to Fairfax County Parkway and Franconia-Springfield Parkway. The primary purpose of this study is to assess short-term multimodal improvements that can be implemented along Fairfax County Parkway and Franconia-Springfield Parkway with the following general criteria:

- Address locations with high crash frequency or severity
- Address locations with existing traffic congestion or operational issues
- Identify substandard or missing pedestrian and bicycle facilities
- Identify projects that can be quickly implemented—with no or limited right-of-way required and minimal utility impacts
- Identify projects with low construction costs

This project also provides a foundation of existing conditions that can be utilized for the second phase of the study—the Fairfax County Parkway/Franconia-Springfield Parkway Alternatives Analysis and Long-Term Planning Study. The study area consists of all of the Fairfax County Parkway and Franconia-Springfield Parkway as shown in **Figure 1**.

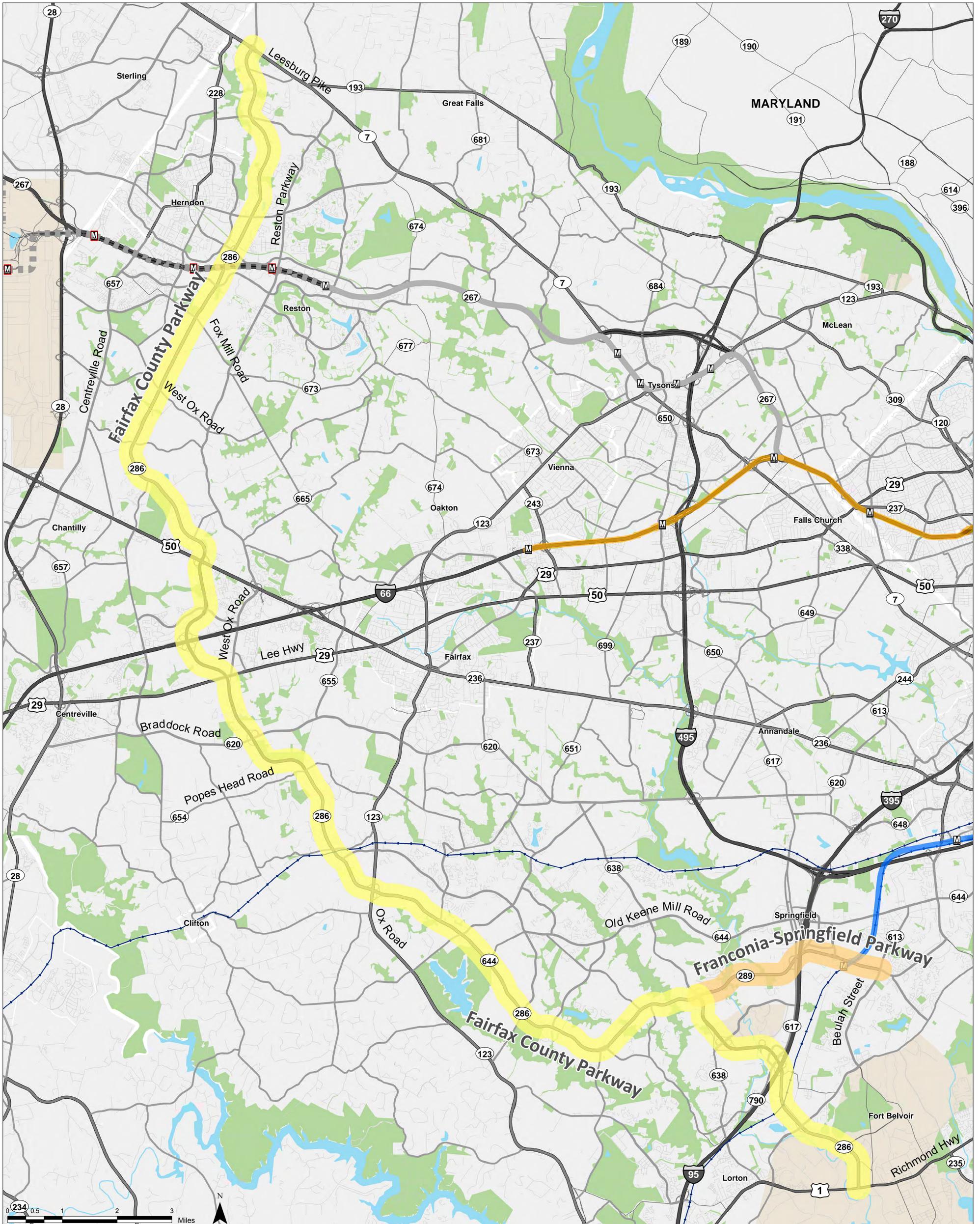


Figure 1: Study Area Limits

## PUBLIC INVOLVEMENT

Two series of public information meetings were hosted as part of the study. The first series of meetings were hosted in June 2016 to provide an overview of the project goals and objectives; share preliminary findings from the field investigations, safety reviews, and initial operational analyses; and solicit input on additional corridor issues and mitigation strategies from attendees. A total of three meetings were hosted at different geographic locations along the corridor to capture the greatest number of corridor users. To communicate the range of issues and preliminary recommended improvements identified, an interactive PDF tool (**Appendix I**) was developed that summarized issues and improvements by location.

Following the first series of meetings, the list of issues and associated recommended improvements were expanded to include input received during the meetings and through subsequent feedback. Many of the recommended improvements presented to the public at these meetings were corroborated by the feedback received. Additional issues and improvements were offered, some reflecting specific locations and issues, while others were general in nature and applied to many locations within the study area. Some of the site-specific recommended improvements included:

- Add a second northbound left-turn lane at Wiehle Avenue
- Active control of crosswalks across the Sunset Hills Road and Route 50 ramps
- Increased capacity for the eastbound right-turn movement at Franklin Farm Road
- Improve the crossing of Horse Pen Run along the FCP trail to reduce the grade changes approaching the bridge from the south



*Exhibit 2: Open house forum during one of the June 2016 public meetings*

Information gathered through the first set of meetings was used to update the planning and analysis efforts completed through June 2016. The product of these efforts was the development of short-term mitigation opportunities (improvements) that could be implemented in less than five years, which is described in greater detail in Chapter 7 (Corridor Multimodal Short-Term Improvements).

The second series of meetings hosted in November 2016, again at three different geographic locations, had two primary objectives:

1. Provide an update to the public regarding responses to feedback received during the first series of meetings and how the outcome of the study will be implemented
2. Initiate the long-term study with an interactive discussion among attendees to shape the goals and objectives of the project

Much of the feedback received during the second series of public meetings regarding existing conditions was focused on bicycle and pedestrian access and safety along the Fairfax County Parkway Trail. Trail maintenance, enhanced safety at crossing locations, and connectivity to residential communities were some of the topics discussed. A handful of vehicular traffic operations topics were also discussed including the geometric configuration of Franklin Farms Road at FCP, queuing at Wiehle Avenue, and congestion through Huntsman Boulevard. Feedback received during the meeting was used to update the

recommended improvements included in the interactive PDF tool (**Appendix I**) that summarized issues and improvements by location.



*Exhibit 3: Roundtable discussion during one of the November 2016 public meetings*

During the meetings, roundtable discussions were facilitated among meeting attendees to understand the different long-term perspectives and priorities of corridor users. A questionnaire was used to guide the discussion, which gauged travel modes, purposes, and trip lengths; prioritization of corridor use, transportation management strategies (e.g. HOV lanes, HOT lanes, additional travel lanes, transit, etc.); design strategies; and right-of-way (ROW) impacts. The following is a summary of the feedback captured from the questionnaire:

- Current travel along the Parkways is predominantly accomplished by personal vehicle
- Future use of the corridor would continue to be accomplished using personal vehicles for work and personal trips, however, increased travel by foot and bicycle is an interest of existing corridor users
- Transit use could increase if more accessible, direct routes were made available
- Demand management should be balanced among vehicles crossing the Parkways and vehicles traveling along the Parkways
- HOV lanes, additional capacity (e.g. new lanes, interchanges), transit, and bicycle/pedestrian facilities were identified as the top priorities for transportation management strategies
- ROW impacts should be minimized when it comes to expanding capacity of the Parkways

The feedback will be used to support the early planning stages for the long-term study.

## 2 RECENT AND ONGOING TRANSPORTATION PROJECTS

**Figure 2** provides an overview of recent and ongoing transportation projects that are relevant to the evaluation of existing conditions for the Fairfax County Parkway and Franconia-Springfield Parkway. The map is inclusive of planning, design, and construction projects that will directly impact the corridor and the scale of near-term recommended improvements to mitigate operational and safety issues identified as part of this study. The following list of projects is intended to complement the map, but also includes projects and studies that are beyond the scope of the near-term evaluation of the corridor but could impact long-term operations. In general, **Figure 2** depicts projects that are anticipated to begin design or construction by the year 2020.

### RECENT PROJECTS

While Fairfax County Parkway has been under constant development since 1987, several large projects within the parkway have been completed recently.

#### 2.1.1. Fairfax County Parkway (Route 286) Corridor Study

In response to concerns regarding recurring congestion along the 3-mile section of Fairfax County Parkway between I-95 and Richmond Highway, FCDOT initiated a corridor study to develop short-term improvements for congestion relief. These improvements included signal timing updates, lane configuration changes, and minor infrastructure modifications. A number of improvements were identified with corresponding planning level cost estimates, which were documented in a final report in September 2015. Based on feedback from the Fairfax County Board of Supervisors at the Board Transportation Committee meeting in December 2015, a focused evaluation of improvements to the Loisdale Road intersection was completed. The supplemental memorandum prepared in February 2016 includes a variety of improvements, with recommendations for improvements to consider based on a benefit cost analysis.

#### 2.1.2. Fair Lakes Parkway/Monument Drive Interchange

Completed in September 2013, this project widened Fairfax County Parkway from four to six lanes from Rugby Road through the interchange with I-66 (approximately three miles). The project also eliminated traffic signals at Fair Lakes Parkway and Monument Drive. Currently, there are no mainline traffic signals on Fairfax County Parkway between Popes Head Road and Route 50, a distance of nearly five miles.

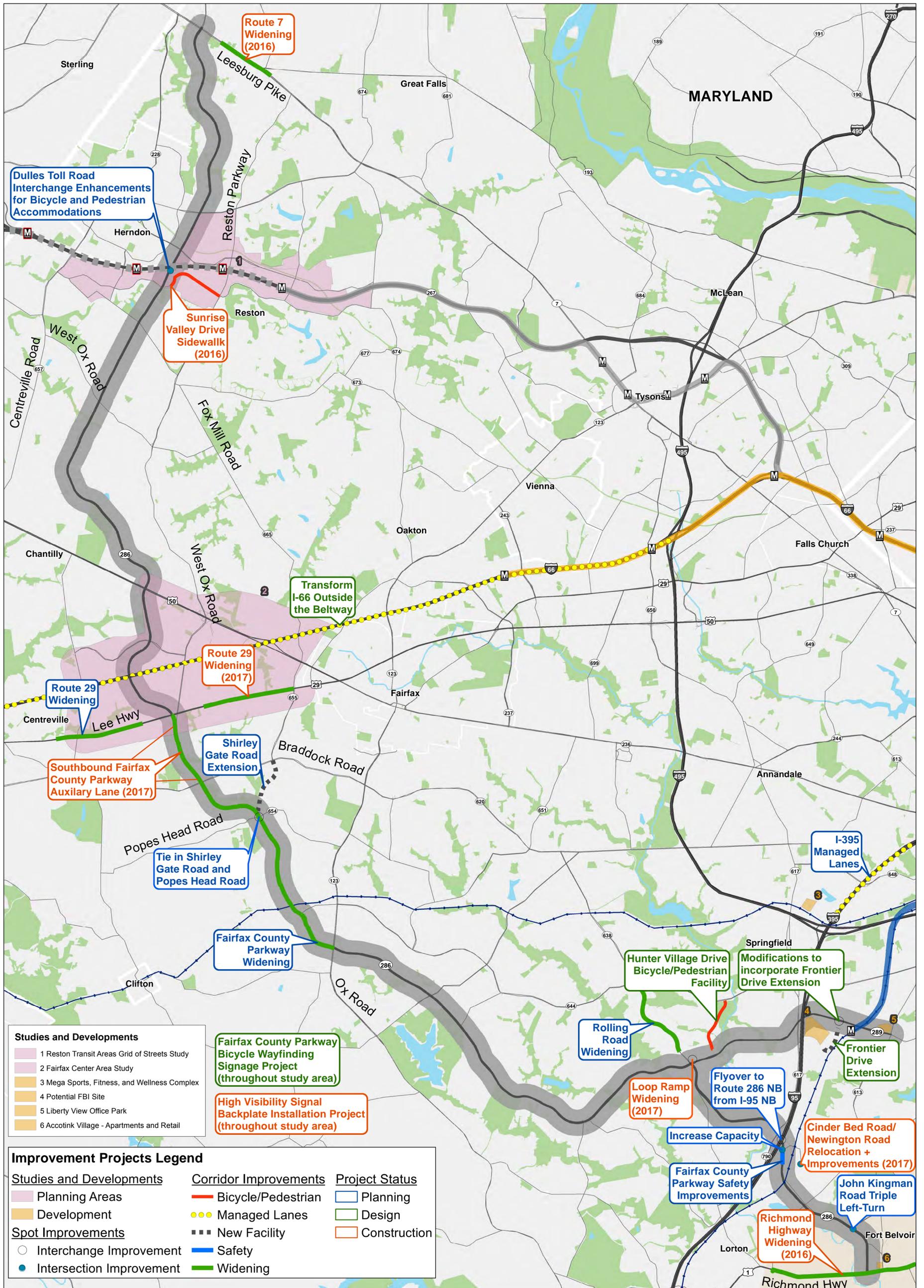
#### 2.1.3. Final Fairfax County Parkway Segment

Construction of the final 2-mile segment of Fairfax County Parkway between I-95 and Rolling Road began in September 2010 and was completed in the Fall of 2012.

As part of the project, a new interchange was constructed to provide a new access road, Barta Road, for Fort Belvoir North (formerly the Engineer Proving Grounds). The interchange at Boudinot Drive was completed in 2011, providing full access between Boudinot Drive/Fullerton Road and Fairfax County Parkway. Rolling Road was relocated to allow the construction of an interchange between Rolling Road, the new section of Fairfax County Parkway, and Franconia-Springfield Parkway.



*Exhibit 4: Signalized intersection on Fair Lakes Parkway at the interchange with Fairfax County Parkway*



- Studies and Developments**
- 1 Reston Transit Areas Grid of Streets Study
  - 2 Fairfax Center Area Study
  - 3 Mega Sports, Fitness, and Wellness Complex
  - 4 Potential FBI Site
  - 5 Liberty View Office Park
  - 6 Accotink Village - Apartments and Retail

**Improvement Projects Legend**

|                                 |                              |                       |
|---------------------------------|------------------------------|-----------------------|
| <b>Studies and Developments</b> | <b>Corridor Improvements</b> | <b>Project Status</b> |
| Planning Areas                  | Bicycle/Pedestrian           | Planning              |
| Development                     | Managed Lanes                | Design                |
| <b>Spot Improvements</b>        | New Facility                 | Construction          |
| Interchange Improvement         | Safety                       |                       |
| Intersection Improvement        | Widening                     |                       |

0 0.5 1 2 Miles

**Legend**

- Study Area
- Major Road
- Rail
- Orange Line Metrorail
- Blue Line Metrorail
- Silver Line Metrorail
- Future Silver Line Metrorail
- Metrorail Station
- Future Metrorail Stations

Figure 2: Overview of Transportation Planning, Design, and Construction Projects

#### 2.1.4. Jeff Todd Way (Formerly Mulligan Road)

Opened in August 2014, this project consisted of the construction of a new connector road between Richmond Highway and Telegraph Road near Fort Belvoir. The project also widened Telegraph Road from two lanes to four lanes between Beulah Street and Leaf Roads. The improvements provide enhanced circulation around Fort Belvoir. In addition to enhanced vehicular access, the project also provided a 10-foot shared use path between Telegraph Road and Pole Road on the west side of Jeff Todd Way. South of Pole Road, 5-foot sidewalks are provided on both sides of Jeff Todd Way.

#### 2.1.5. Route 7 Widening

Completed in February 2016, Route 7 was widened from four to six lanes over an approximately 1.5-mile stretch of the corridor between Rolling Holly Drive and Reston Avenue. The section of roadway recently improved is severely congested during peak periods and the goal of the widening project was to reduce congestion and improve operations and safety. This project extends the length of the six-lane section of Route 7 to the congested intersection of Georgetown Pike. East of Reston Avenue, Route 7 is a four-lane facility, with a long-term vision to be widened to a continuous six-lane facility between Fairfax County Parkway and Tysons. The estimated completion of the widening of approximately 7 miles of Route 7 into Tysons is the year 2025. When completed, the facility will include 10-foot shared use paths on both sides of Route 7 along the entire length of the improved 8-mile section of roadway.

#### 2.1.6. Franconia-Springfield Metrorail Station Bus Improvements

In September 2016, the Washington Metropolitan Area Transit Authority (WMATA) unveiled an improved bus facility at the Franconia-Springfield Metrorail Station. The improvements expanded capacity and provided additional amenities for Metrobus passengers, including larger bus shelters with real-time bus arrival information. Sidewalk and crosswalk improvements for safer pedestrian access were also included as part of the improvements.



*Exhibit 5: New bus canopies installed as part of the Franconia-Springfield Metrorail Station Bus Improvements*

## PLANNING, DESIGN, AND CONSTRUCTION PROJECTS

#### 2.2.1. Richmond Highway Widening

The Eastern Federal Lands Highway Division (EFLHD), in cooperation with VDOT, US Garrison Fort Belvoir, and Fairfax County has initiated a project to widen a 3.68-mile segment of Richmond Highway from Telegraph Road to Mount Vernon Highway (Route 235). The project consists of widening Richmond Highway from four through lanes to six through lanes and includes the addition of left- and right-turn lanes, multi-use trails, pedestrian sidewalk, on-road bicycle facilities, and a wide center lane that may accommodate commuter bus or rail in the future. The construction of shared use path along Route 286 between Richmond Highway and Backlick Road is being constructed as part of the project. The improvements are necessary to improve traffic operations on Richmond Highway and improve access to a new army hospital located on Fort Belvoir. Construction of these improvements has started and is anticipated to be completed in 2016.

### 2.2.2. Embark Richmond Highway

Embark Richmond Highway (Embark) is a coordinated effort to implement recommendations for a multimodal solution for transportation along Richmond Highway that consists of two separate efforts: (1) the Route 1 Multimodal Alternatives Analysis and (2) the Comprehensive Plan Amendment for Embark Richmond Highway.

#### 2.1.1.1 Route 1 Multimodal Alternatives Analysis

The Route 1 Multimodal Alternatives Analysis was conducted by the Virginia Department of Rail and Public Transportation (DRPT). The 18-month study was a collaborative effort among Fairfax County, Prince William County, VDOT, and the Virginia Office of Intermodal Planning and Investment. A report published in February 2015 recommended the implementation of a median-running bus rapid transit (BRT) system, a six-lane cross section for Richmond Highway, pedestrian and bicycle improvements, and additional local street connections along the corridor. While the project recommends a three-phase implementation process, a fourth phase was recommended to extend the Metrorail Yellow Line from Huntington to Hybla Valley. The current target is to complete the first two phases by 2028.

#### 2.1.1.2 Comprehensive Plan Amendment for Embark Richmond Highway

Building upon the recommendations in the Route 1 Multimodal Alternatives Analysis, FCDOT intends to assess and refine the recommendations by providing more detailed guidance in the Comprehensive Plan for the implementation of transit in the corridor. The amendment to the Comprehensive Plan will consider land use density and mix along the Richmond Highway corridor (Fort Belvoir to the Huntington Metrorail Station) and policy guidance supporting future Metrorail extension from the Huntington Metrorail Station to Hybla Valley. Development levels are being evaluated that provide a balance between mitigating transportation impacts to the corridor and providing appropriate multimodal transportation opportunities.

### 2.2.3. Cinder Bed Road Intersection Improvements

The existing intersection of Cinder Bed Road and Newington Road is currently being relocated approximately 450 feet north of the current location. Improvements include sidewalk enhancements, a culvert along Long Branch Creek, and an additional right-turn lane with access to the county's vehicle maintenance facility. Construction is expected to be complete in 2017.

### 2.2.4. WMATA Bus Facility

This development includes construction of a new bus operations and maintenance facility to serve up to 160 WMATA buses and corresponding employees/vendors on a 17.37-acre property located on Cinder Bed Road in Fairfax County. Access to the new facility is proposed via a single full-movement driveway on Cinder Bed Road approximately 500 feet north of Hill Park Drive.



*Exhibit 6: Rendering of Cinder Bed Road Bus Facility*

### 2.2.5. Terminal Road Safety Improvements

VDOT has proposed a project to improve the Terminal Road intersection with FCP with the objective of reducing rear-end, side-swipe same direction, and fixed object-off road crashes. The improvements

include modifying the existing southbound right-turn lane to be a shared right and through lane at the Terminal Road intersection. An additional through lane on Fairfax County Parkway is also proposed south of the Terminal Road intersection ending just north of the Backlick Road Connector intersection. The project is waiting for construction funding to implement.

### 2.2.6. Frontier Drive Extension

Fairfax County recently completed a study of the Frontier Drive interchange with Franconia-Springfield Parkway. The purpose of the study was to identify a preferred geometric and operational configuration of the extension of Frontier Drive south toward Loisdale Road along with improvements to the existing interchanges of Franconia-Springfield Parkway with Frontier Drive and the Metro access loop ramp. The recommendations from the study included:

- Modifications to circulation and access within the Franconia-Springfield Metrorail Station facility
- A signalized intersection in the southwest quadrant of the facility with the Frontier Drive Extension
- A braided ramp configuration for the Metro access loop westbound on-ramp to Franconia-Springfield Parkway and the westbound off-ramp to Frontier Drive. The braided ramp will eliminate the existing weave segment along westbound FSP between the Frontier Drive and Metro access loop ramp interchanges.

Pedestrian and bicycle access will be accommodated in the design and construction of improvements as part of this project. VDOT is currently managing the design of the recommended improvements.

### 2.2.7. I-95 Express Lanes

Opened in December 2014, data for the study of FCP and FSP was collected prior to the opening of the I-95 Express Lanes. Previously operating as an HOV-3 facility, the center-running, barrier-separated lanes on I-95 were converted to a HOT facility. Travel within the lanes is free to vehicles carrying three or more passengers (HOV-3), but in order to provide travel options to vehicles with fewer than three passengers, a variable toll rate can be paid to travel within the I-95 Express Lanes. Direct access to the I-95 Express Lanes is provided at an existing signalized intersection on Franconia Springfield Parkway as well as a reversible ramp that terminates at the intersection of Boudinot Drive and Alban Road, just off Fairfax County Parkway. In addition, a southbound-only access ramp is located off of Heller Road to the north of the Fairfax County Parkway and the Boudinot Drive interchange. Vehicles with more than two axles and vehicles towing trailers are not permitted to use the I-95 Express Lanes. Buses are exempt from the axle restriction and tolling if operating as a transit vehicle.

### 2.2.8. Fairfax County Parkway/I-95 Interchange Improvements

The existing off-ramp from I-95 northbound to Fairfax County Parkway northbound is configured as a single loop ramp. The projected increase in traffic associated with the extension of Fairfax County Parkway and the large employment center at Fort Belvoir North is expected to exceed the available capacity of this ramp. The proposed improvement will replace the loop ramp with a directional flyover ramp. In addition, operations at the existing signalized intersection at Loisdale Road will be modified to allow for left-turn movements from the existing off-ramp, providing access to North Backlick Road. Preliminary engineering was completed in 2013 and the project is waiting for construction funding.

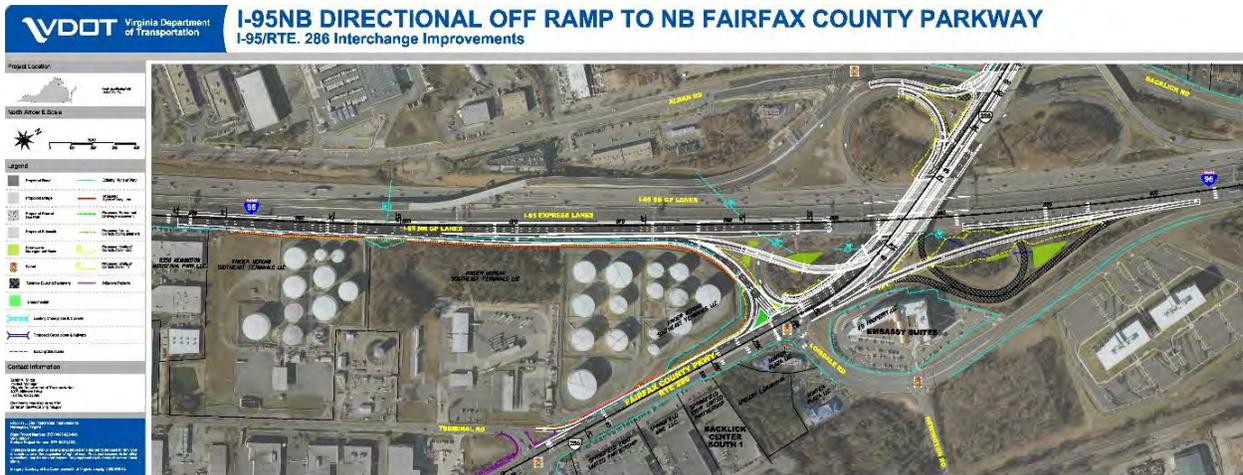


Exhibit 7: Preliminary Design Plans for the Fairfax County Parkway/I-95 Interchange Improvements

### 2.2.9. Fairfax County Parkway/Rolling Road/Franconia-Springfield Parkway Interchange Improvements

This project was intended to provide interchange improvements to help meet projected increases in future traffic demands. The ultimate configuration of the interchange will eliminate the free-flow northbound right-turn movement and two right-turn lanes will be constructed at the approach to the existing signalized intersection. This addresses the conflict between the free-flow right-turn and southbound left-turn movements. The ramp was also widened to provide two lanes of access to continue onto Fairfax County Parkway. The first phase of improvements was completed in 2016, which provided for a free-flow northbound right-turn lane and a dedicated receiving lane for the southbound left-turn movement. The timeline for the buildout of the ultimate configuration is yet to be determined.

### 2.2.10. Rolling Road Widening

An approximately 2-mile section of Rolling Road between Franconia-Springfield Parkway and Old Keene Mill Road will be widened to four lanes to reduce congestion and improve safety. This VDOT project is anticipated to begin construction in 2018 and will include left- and right-turn lanes, stormwater management facilities, and provide accommodations for pedestrians and bicyclists.

### 2.2.11. Hunter Village Drive Shoulder Widening

An approximately 2-mile section of Hunter Village Drive between Franconia-Springfield Parkway and Old Keene Mill Road will be retrofitted to provide bicycle and pedestrian facilities within the existing shoulder. This project will tie into the existing Gerry Connolly Cross Country Trail that extends west toward Rolling Road.

### 2.2.12. Hooes Road/Newington Forest Avenue

Local intersection improvements are proposed to enhance vehicular operations and improve pedestrian accessibility. The sidewalk is proposed to be extended along Newington Forest Avenue to provide connectivity to the nearby residential neighborhood. The project is part of the third Four-Year Transportation Program approved by the board of supervisors in 2012 and is included in the 2014 Transportation Bond Referendum.

### 2.2.13. Shirley Gate Road Extended Corridor Planning Study

The intersection of Popes Head Road with the Fairfax County Parkway is the first signalized intersection south of I-66, and the peak period intersection volumes and operations create significant congestion and

queuing along Fairfax County Parkway. A planning level study was completed in 2016 that evaluated potential alternatives for the extension of Shirley Gate Road to Fairfax County Parkway and connection opportunities of this roadway with the Fairfax County Parkway. Alternatives considered eliminating direct access to the Parkway from Popes Head Road or provided for an interchange at the connection point of Shirley Gate Road Extended with the Fairfax County Parkway. The preliminary alignment of Shirley Gate Road Extended considers a shared use path on one side of the new roadway and a sidewalk on the other. Details regarding the actual pedestrian and bicycle facility accommodations will be finalized as part of future design efforts.

#### **2.2.14. Southbound Fairfax County Parkway Auxiliary Lane between Route 29 and Braddock Road**

PM peak period congestion in the southbound direction of Fairfax County Parkway is a recurring issue between Route 29 and Popes Head Road. A contributing factor to the congestion is the high volume of traffic entering the southbound lanes of Fairfax County Parkway from the Route 29 interchange, followed by a high volume of traffic exiting to Braddock Road at the next interchange. Construction of the auxiliary lane between these two interchanges was recently completed. This provides a third travel lane that facilitates the movement between these two interchanges.

#### **2.2.15. Fairfax County Parkway Widening Project**

VDOT has initiated design of roadway widening improvements to Fairfax County Parkway between Route 29 and Route 123. The project will increase the number of lanes along the facility to three lanes in each direction. Interchange improvements at the Popes Head Road intersection will be included with the project in order to alleviate congestion issues at this location. The project will provide an additional three miles of limited access operations along the corridor, increasing the total length of free-flow conditions to eight miles between Burke Centre Parkway and Route 50.

#### **2.2.16. Fairfax Center Area Study**

The Fairfax Center Area Study is a multi-phase planning study to examine current recommendations and existing conditions within the Fairfax County Comprehensive Plan. The Fairfax Center Area comprises approximately 5,500 acres west of the City of Fairfax and east of Centreville, generally between Lee Jackson Memorial Highway (Route 50) and Lee Highway (Route 29). The board of supervisors adopted guidance for the Fairfax Center Area in the county's Comprehensive Plan in 1982, establishing a vision for the area. Since the plan's adoption, the area has evolved from green fields into a community of neighborhoods, retail, and employment. The Fairfax Center Area Study provides an opportunity to assess where the Fairfax Center Area is now and how it will continue to evolve in the next 20 to 30 years.

#### **2.2.17. Route 29 Widening**

Two segments of Route 29 have been identified for widening from four to six lanes near Fairfax County Parkway. The first segment, which is currently under construction, extends from Legato Road to Stevenson Street and consists of widening in the northbound direction. The southbound direction is already configured with three travel lanes. Pedestrian accommodations along the south side of the roadway are also included with the arterial improvements. At Waples Mill Road, a third through lane is being constructed along with an exclusive right-turn lane.

The second segment of roadway widening along Route 29 will occur between Union Mill Road and Buckley's Gate Drive. Unlike the previously mentioned section of Route 29, the majority of this section of roadway is currently configured with four travel lanes. This widening project will be the last section along the Route 29, providing for six lanes between Shirley Gate Road and Centreville.



County Parkway, and Reston Parkway. These crossings would provide vehicular, pedestrian, and bicycle access across the Dulles Toll Road and include:

- Town Center Parkway Underpass
- Soapstone Connector
- South Lakes Drive Overpass

While not included in the Reston Network Analysis, the Rock Hill Overpass is a fourth crossing of the Dulles Toll Road that is recommended to further enhance north-south access and is included along with the three above mentioned crossings in the Reston Transportation Improvements Funding.

### **2.2.20. Sunrise Valley Drive Bicycle and Pedestrian Improvements**

The existing trail on Sunrise Valley Drive will be replaced to provide a consistent width of eight feet within the existing ROW. In addition, on-street bike lanes will be constructed within the existing roadway width of Sunrise Valley Drive by reducing the width of the existing median.

### **2.2.21. Countywide Transit Network Study (CTNS)**

In 2016, Fairfax County completed the CTNS to determine the type of transit systems needed to accommodate desired economic growth throughout the county over the next several decades. The final report includes recommendations for where Metrorail should be extended, where streetcar or light rail systems are appropriate, and where dedicated lanes that allow buses to move faster could go. The study also recommended how the system can be phased in and funded over time. The outcome of the study identified Fairfax County Parkway and Franconia-Springfield Parkway as high quality transit network express service routes. Other express service routes identified include Route 7, Route 50, Route 29, and Braddock Road.

### **2.2.22. Comprehensive Plan**

Fairfax County Parkway from the Dulles Toll Road to the south has been designated as an Enhanced Public Transportation Corridor in the county's Comprehensive plan. The entire length of Franconia-Springfield Parkway has also been designated as an Enhanced Public Transportation Corridor. This designation carries the recommendation for existing conditions to be evaluated and major public transportation facilities provided based on the results of a comprehensive alternatives analysis. The Comprehensive Plan recommends HOV lanes for FSP and FCP between Franconia-Springfield Parkway (State Route 289) at its interchange with I-95 and Leesburg Pike (State Route 7). The Comprehensive Plan also recommends that Shirley Gate Road be extended to a grade-separated interchange with Fairfax County Parkway and Popes Head Road. Along FSP, the Comprehensive Plan also recommends that the roadway be widened to eight lanes between Fairfax County Parkway and Frontier Drive; the existing signalized intersection at Bonniemill Lane be improved to a grade-separated interchange; and the local street network in the vicinity of the I-95 and Frontier Drive interchanges be improved to meet future development needs.

The majority of Fairfax County Parkway and Franconia-Springfield Parkway is bordered by land zoned for residential use. Approximately 15 percent of the land bordering Fairfax County Parkway is zoned for planned development. Most of these zoning districts are for planned development housing and planned residential communities, which require a minimum amount of developable land and corresponding comprehensive plans. The remainder of the land bordering FCP is zoned for commercial and industrial use, which are established to encourage innovative and creative designs for commercial development. The character of Franconia-Springfield Parkway changes from west to east, transitioning from predominantly residential land uses adjacent to the facility west of I-95 to mostly commercial and

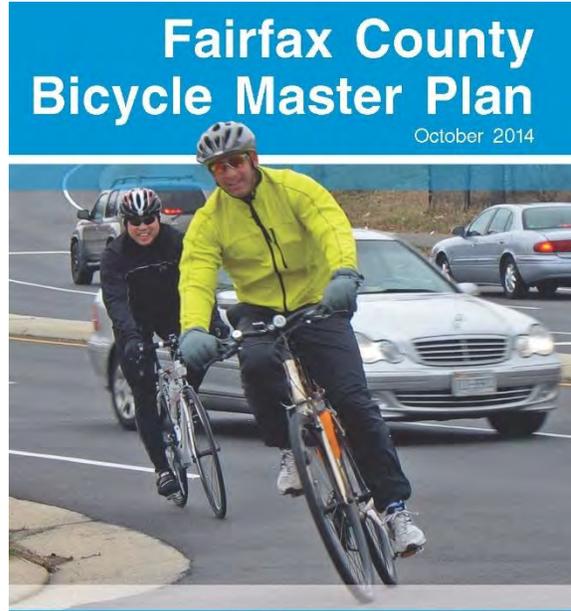
industrial east of I-95, with residential land uses set further back from the corridor. See **Figure 3** for greater detail regarding zoning.

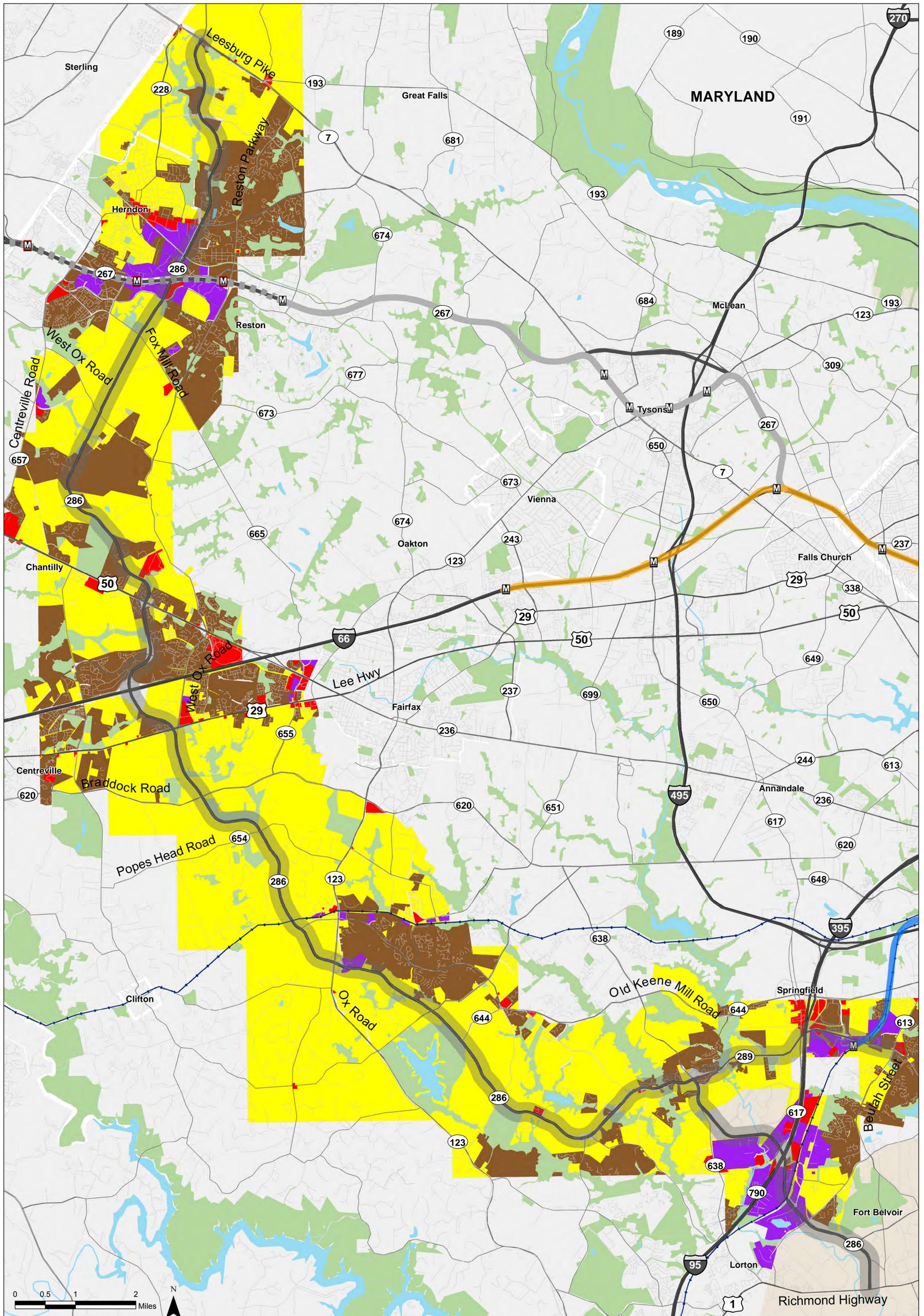
The following is a summary of the projects included in the Fairfax County Comprehensive Plan along Fairfax County Parkway and Franconia-Springfield Parkway. Many of these projects coincide to the projects detailed below under the planned projects. The list represents the projects considered by the county in the Comprehensive Plan amended through September 2, 2015 (listed from north to south).

- Widening of Fairfax County Parkway to six lanes, with the additional lanes allowing for HOV operations between Route 7 and I-95, by way of Franconia-Springfield Parkway. Fairfax County Parkway is planned to be a six-lane facility between Route 7 and the Sydenstricker Road interchange as well as between Franconia-Springfield Parkway and I-95. South of I-95, the roadway will remain a four-lane facility.
- Widening of Franconia-Springfield Parkway to eight lanes between Rolling Road and the Metrorail loop ramp interchange, with the additional lanes allowing for HOV operations
- Widening of the following intersecting arterials (from “X” to “Y” lanes)
  - Sunset Hills Road (four to six)
  - Fox Mill Road (two to four)
  - West Ox Road (two to four)
  - Stringfellow Road (two to four)
  - Rugby Road (two to four)
  - Route 29 (four to six)
  - Braddock Road (four to six)
  - Route 123 (four to six)
  - Old Keene Mill Road (two to four)
  - Lee Chapel Road (2 to 4)
  - Hooes Road (two to four)
  - Sydenstricker Road (two to four)
  - Rolling Road (two to four)
  - Fullerton Road (two to four)
  - Alban Road (two to four)
  - Newington Road (two to four)
  - Loisdale Road (two to four)
  - Telegraph Road (four to six)
  - Richmond Highway (four to six)
- New roadway alignments (“X” lanes):
  - McLearen Road (four)
  - Shirley Gate Road (four)
  - Frontier Drive (four)
- Interchange Improvements (new or existing):
  - Baron Cameron Avenue (existing)
  - Sunset Hills Road (existing)
  - Dulles Toll Road (existing)
  - Sunrise Valley Drive (new)
  - McLearen Road (new)
  - Route 29/W Ox Road (exist.)
  - Shirley Gate Road (new)
  - Popes Head Road (new)
  - Hooes Road (existing)
  - Rolling Road/FSP (existing)
  - Barta Road (existing)
  - Fullerton Road (new)
  - I-95 (existing)
  - Telegraph Road (existing)
  - John J. Kingman Road (new)
  - Richmond Highway (new)
  - Bonniemill Lane (new)
  - Beulah Street (new)

### 2.2.23. Bicycle Master Plan

In 2014, Fairfax County published the Bicycle Master Plan that includes recommendations for a bikeway network within the County. The plan includes two parts: part one focused specifically on Tysons, and part two addressed the entire county. Fairfax County Parkway is already supporting bicycle access through the shared-use path that runs alongside the much of the roadway. The Master Plan does not recommend filling any gaps along the roadway that are missing today, primarily due to the challenges associated with providing access through interchange locations (e.g. I-66, Route 123, I-95). Building upon this existing asset, the Master Plan has identified a number of arterial and local streets that intersect with Fairfax County Parkway and Franconia-Springfield Parkway to be modified to provide some degree of bicycle facility (e.g. shared travel lanes, bike lanes, shared-use paths). No significant modifications to the existing network along Fairfax County Parkway and Franconia-Springfield Parkway are identified with the exception of a bike lane along FSP between the Metrorail loop ramp interchange and Beulah Street. This would separate bicycle traffic from the existing shared-use path located to the north of the roadway. A map of the Bicycle Master Plan is included in **Appendix H**.





| Legend |                         |  |                          |
|--------|-------------------------|--|--------------------------|
|        | Study Area              |  | Orange Metrorail         |
|        | Major Road              |  | Blue Metrorail           |
|        | Rail                    |  | Silver Metrorail         |
|        | Future Silver Metrorail |  | Metrorail Station        |
|        | Commercial              |  | Future Metrorail Station |
|        | Park                    |  | Water                    |
|        | Federally-Owned Land    |  | Industrial               |
|        | Planned Units           |  | Residential              |

Figure 3: Project Zoning Map

## PLANNED PROJECTS AND DEVELOPMENTS

### 2.3.1. Metropolitan Washington Council of Governments (MWCOG)

The National Capital Region Transportation Planning Board (TPB) is the metropolitan planning organization (MPO) comprised of cities and counties along either side of the Potomac River in Maryland, Virginia, and the District of Columbia. It is the responsibility of the TPB to develop a 6-year transportation improvement plan (TIP) and a fiscally constrained long range plan (CLRP). The TIP provides a list of projects and programs that will be funded during the next six years, and the CLRP identifies all regionally significant transportation projects to be completed in the next 25 years.

#### 2.1.1.3 FY 2015-2020 TIP

Projects and programs included in the TIP that may impact Fairfax County Parkway and Franconia-Springfield Parkway include:

- The widening of the existing single-lane loop ramp in the northeast quadrant of the Rolling Road/Fairfax County Parkway/Franconia-Springfield Parkway to two lanes. This is currently under construction.
- The widening of Rolling Road to four lanes between Delong Drive and Fullerton Road
- Preliminary engineering for the widening of Rolling Road between Fairfax County Parkway and Old Keene Mill Road (Route 644)

#### 2.1.1.4 2015 CLRP

Projects and programs included in the 2015 CLRP that may impact Fairfax County Parkway and Franconia-Springfield Parkway include:

- The widening of Rolling Road to four lanes from approximately four-tenths of a mile north of Fairfax County Parkway to Old Keene Mill Road (Route 644)
- The widening of Route 123 from four to six lanes between Braddock Road and Hoes Road. This improvement will support the movement of traffic to and from the south between I-95 and Fairfax County Parkway.
- The widening of Stringfellow Road from two lanes to four lanes between Fairfax County Parkway and Lee Jackson Memorial Highway (construction recently completed)
- The widening of Braddock Road from four to six lanes between Legato Road (just east of Fairfax County Parkway) and Shirley Gate Road/Waples Mill Road
- The widening of Fairfax County Parkway from four to six lanes between the Dulles Toll Road and Route 123. The additional lanes would function as HOV lanes during peak hours. The long-term vision is for HOV lanes to be provided between Route 7 and I-95 by way of Franconia-Springfield Parkway.
- The construction of an interchange for general purpose lane access between Franconia Springfield Parkway and I-95 (access limited to and from the north)

### 2.3.2. Fairfax County Board of Supervisors Six-Year Transportation Project Priorities

The following list of projects were identified by the board of supervisors in January 2014 that will affect the project corridors. A total amount of \$1.4 billion was approved, the majority of which will come from state and regional sources. The list of projects was developed and prioritized considering input from the public during an outreach process. Note that many of these projects are already included in the list of projects and studies provided above.

- Bicycle wayfinding signage along the entire length of Fairfax County Parkway and Franconia-Springfield Parkway and beyond
- Shirley Gate Road extension between Braddock Road and Fairfax County Parkway
- Fairfax County Parkway and Popes Head Road interchange and future connection with the Shirley Gate Road extension
- I-95 and Fairfax County Parkway northbound flyover ramp
  - This project is also associated with the spot improvements to Fairfax County Parkway between Telegraph Road and I-95 to provide additional capacity and reduce congestion
- Dulles Toll Road—Town Center Parkway Underpass
- Frontier Drive from Franconia-Springfield Parkway to Loisdale Road and associated braided ramps at the existing interchange
- Widening of Fairfax County Parkway to six lanes between the Dulles Toll Road and Rolling Road. The widening is segmented into five sections between these roadway limits, not including the existing six-lane section between Rugby Road and Route 29.
- Widening of Hoes Road to four lanes between Fairfax County Parkway and Silverbrook Road
- Widening of Rolling Road to four lanes between Franconia-Springfield Parkway and Old Keene Mill Road
- Fairfax County Parkway Enhanced Bus Service

### 2.3.3. Planned Developments

A handful of developments are proposed within the vicinity of the Fairfax County Parkway and Franconia-Springfield Parkway that have the potential to generate additional traffic along the study corridor and increase congestion. These developments have been identified at the time of this study by project stakeholders to consider as recommended improvements and are identified as:

- St. James Group LLC Mega Sports, Fitness, and Wellness Complex: 435,000 square foot sports and fitness complex to be constructed on an existing commercial site along Industrial Drive near Backlick Road and the I-95, I-395, and I-495 interchange
- Consolidated Federal Bureau of Investigation (FBI) Headquarters: the FBI is conducting environmental impact studies (EIS) to determine the optimal site for the consolidated headquarters. One of the sites under consideration is the existing Government Services Administration (GSA) warehouse complex site, which occupies 58 acres between I-95 and the Franconia-Springfield Metro Station.
- Liberty View Office Park: proposed office park expansion in the northwest quadrant of the intersection of Franconia-Springfield Parkway and Beulah Street. The site will consist of approximately 750,000 square feet of Class A office space and approximately 2,500 parking spaces.
- Accotink Village Apartments and Retail: 283 housing units and approximately 12,000 square feet of retail space is to be constructed on a 6.6-acre site on Richmond Highway between Fairfax County Parkway and Fort Belvoir's Tulley Gate

### 3 EXISTING TRANSPORTATION CONDITIONS

#### DATA COLLECTION SUMMARY

Traffic data was collected by Quality Counts, LLC (unless otherwise noted) between May 7 and June 18, 2014 for Fairfax County Parkway. Turning movement count (TMC) data was collected along the Fairfax County Parkway corridor between 6:00 and 9:00 a.m. and between 3:30 and 6:30 p.m. The type and quantity of data included the following:

- TMCs and queuing data collection at 77 intersections in the study area
  - TMCs for six intersections were provided by VDOT from a previous study for the Fairfax County Parkway and Route 29/West Ox Road interchange intersections
- Tube counts at free-flow interchange ramps (32 locations)
- Tube counts at nine locations along mainline Fairfax County Parkway
- Vehicle classification counts at five locations along mainline Fairfax County Parkway
- Travel time data for the entire length of Fairfax County Parkway in each direction during the AM and PM peak periods. Ten runs were completed in each direction for each peak period.

A separate data collection effort for Franconia-Springfield Parkway was conducted in the fall of 2014. TMC data was collected at 13 of the 14 study intersections on a single weekday between October 20 and October 30, 2014. TMC data for the Rolling Road and Barkers Court intersection was collected on May 27, 2015. TMC data was collected between 6:30 and 9:00 a.m. and between 3:30 and 6:30 p.m. The type and quantity of data included the following:

- TMC data collection at 14 intersections in the study area (two of which overlap with the Fairfax County Parkway data collection effort)
- Queuing data collection at seven intersections in the study area
- Tube counts at select free-flow interchange ramps (four locations)
  - Although data was collected along select ramps, hourly volumes can be extracted from the TMC data
- Tube counts at four locations along mainline Franconia-Springfield Parkway
- Vehicle classification counts at two locations along mainline Franconia-Springfield Parkway
- Travel time data for the entire length of Franconia-Springfield Parkway in each direction during the AM and PM peak periods. Six runs were completed in each direction for each peak period.

#### STUDY AREA NETWORK

The 31-mile Fairfax County Parkway is classified as an urban principal arterial consisting of a primarily four-lane divided roadway cross section, with six-lane sections in the vicinity of the Dulles Toll Road, I-66, and I-95. The posted speed limit is 50 miles per hour (mph) along the majority of the corridor. The exception to this is an approximately one-mile section of the corridor between Backlick Road and I-95, which is posted at 40 mph. The Parkway alignment corresponds to an outer beltway to the existing I-495 Capital Beltway, connecting I-95 in the south to I-66 and the Dulles Toll Road to the north. It provides access to several minor arterial and collector roadways along the corridor, feeding into the residential communities and commercial developments. The corridor study focused on bisecting roadways at interchanges and at-grade intersections, with limited inclusion of peripheral intersections that influence operations along the corridor.

The approximately 3-mile Franconia-Springfield Parkway spur is classified as an urban principal arterial consisting of a six-lane divided roadway cross section. The posted speed limit is 50 mph along the entire

roadway; however, the speed limit drops to 35 mph to the east of the intersection with Beulah Street where the road changes names to Manchester Boulevard. The prominent features of the roadway are access to the I-95 Express Lanes as well as the Franconia-Springfield Metrorail Station. The western and eastern portions of Franconia-Springfield Parkway provide access to residential communities, while the central portions of the corridor surrounding the I-95 interchange provide access to primarily industrial and commercial areas.

The limits of the study area are depicted in **Figure 1**. A summary of existing interchange locations is provided in **Table 1**, listed by the intersecting roadway(s) with the relevant mainline facility—Fairfax County Parkway (FCP) or Franconia-Springfield Parkway (FSP).

**Table 1: Existing Interchange Locations**

| FCP |  | FCP (continued) |  |
|-----|--|-----------------|--|
| 1.  | Leesburg Pike                            | 12.             | Sydenstricker Road/Shady Palm Drive and Olde Lantern Way/Gambrill Road |
| 2.  | Baron Cameron Avenue                     | 13.             | Rolling Road/FSP   |
| 3.  | Spring Street                            | 14.             | Barta Road   |
| 4.  | Dulles Toll Road                         | 15.             | Fullerton Road   |
| 5.  | Route 50                                 | 16.             | I-95   |
| 6.  | Monument Drive/Fair Lakes Parkway        | 17.             | Telegraph Road   |
| 7.  | I-66                                     | <b>FSP</b>      |  |
| 8.  | Route 29                                 | 18.             | Backlick Road  |
| 9.  | Braddock Road                            | 19.             | Frontier Drive   |
| 10. | Ox Road                                  | 20.             | Metrostation Loop  |
| 11. | Seabrook Lane/Hooes Road and Pohick Road |                 |  |

## DAILY TRAFFIC VOLUMES

Tube count data was collected for 24 consecutive hours on a single weekday (Tuesday, Wednesday, or Thursday) between May 13 and May 21, 2014. Vehicle classification tube count data was collected for 24 consecutive hours on a single weekday (Tuesday, Wednesday, or Thursday) between May 13 and June 18, 2014 at the following locations:

- Between Richmond Highway and Telegraph Road
- Between Telegraph Road and I-95
- Between I-95 and Franconia-Springfield Parkway

- Between Franconia-Springfield Parkway and Lee Chapel Road
- Between Lee Chapel Road and State Route 123

Forty-eight consecutive hours of traffic volume data was collected between October 28 and October 30, 2014 during the week (Tuesday/Wednesday or Wednesday/Thursday) at the following locations (vehicle classification data was also collected at locations noted with an asterisk):

- Between Rolling Road and Bonniemill Lane\*
- Between Backlick Road and I-95
- Between I-95 and Frontier Drive\*
- Between Walker Lane and Beulah Street

TMCs and tube count data are provided in **Appendix B** and **Appendix C**.

**Figure 4** and **Figure 5** illustrate the travel time in each direction during the AM and PM peak periods, respectively. The figures also illustrate the 24-hour directional traffic volumes and number of lanes. Speed and travel time data can be found in **Appendix D**.

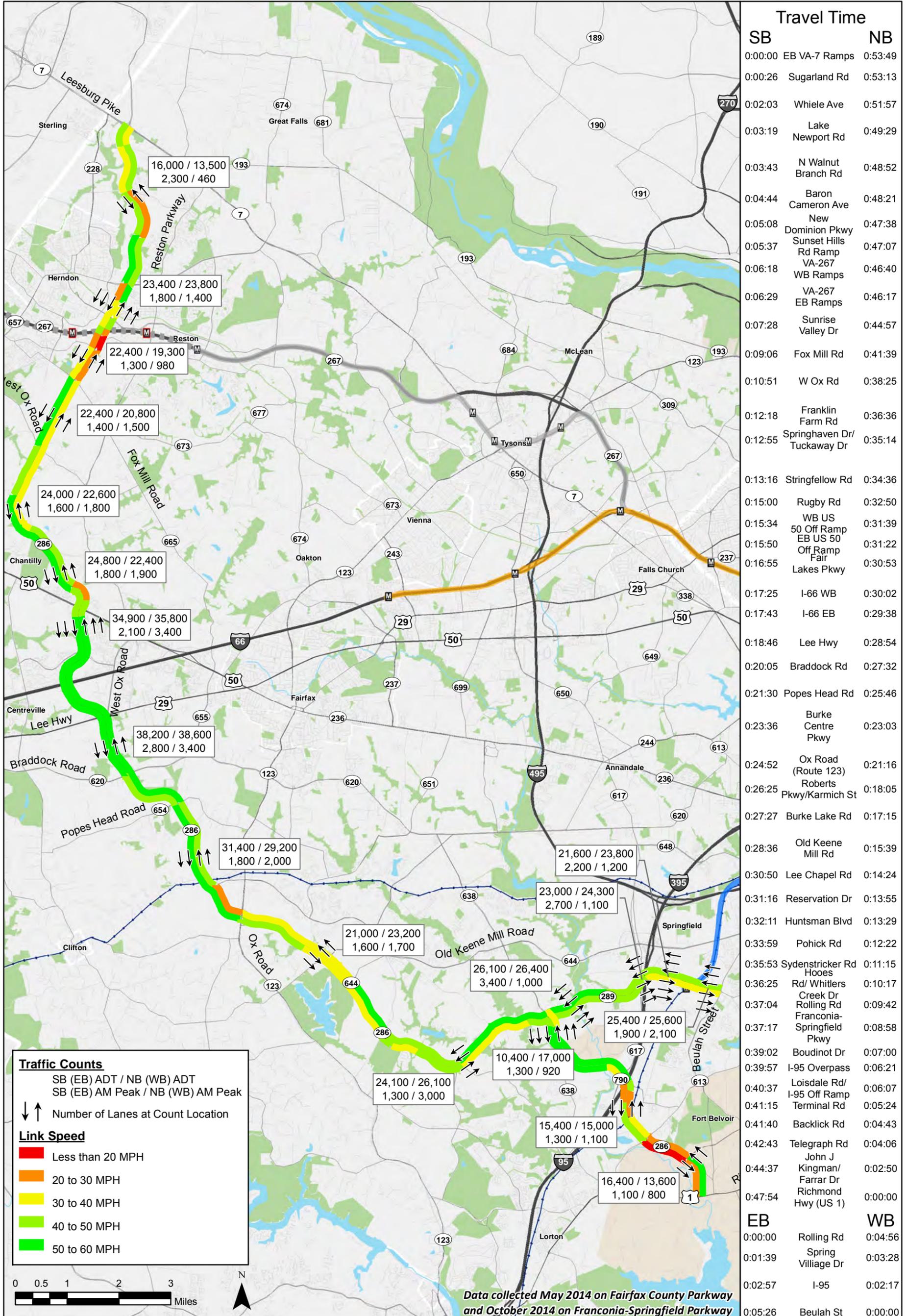
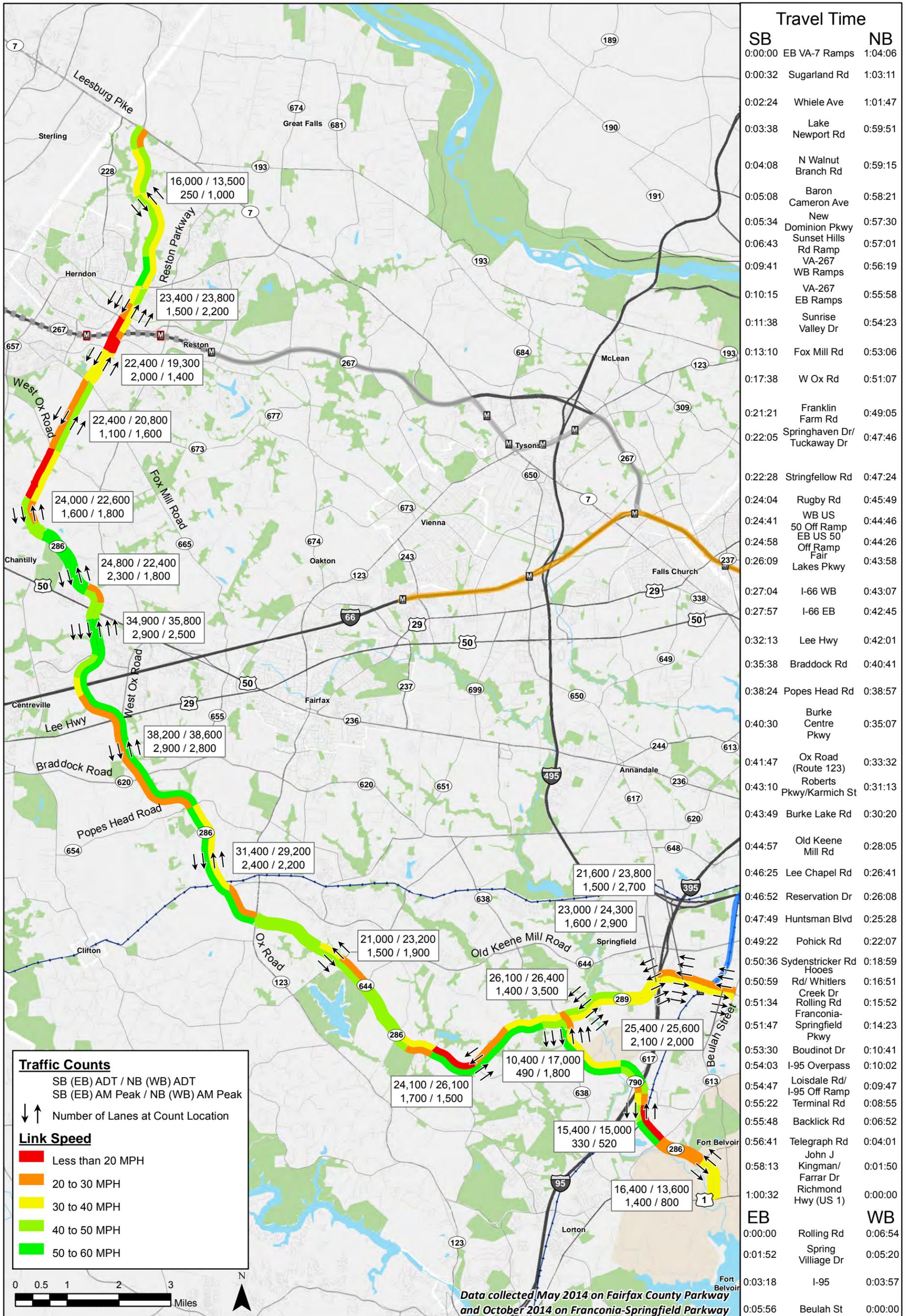


Figure 4: Existing (2014) AM Travel Time, Speed, and Traffic Volumes



| Travel Time |                              |         |
|-------------|------------------------------|---------|
| SB          |                              | NB      |
| 0:00:00     | EB VA-7 Ramps                | 1:04:06 |
| 0:00:32     | Sugarland Rd                 | 1:03:11 |
| 0:02:24     | Whiele Ave                   | 1:01:47 |
| 0:03:38     | Lake Newport Rd              | 0:59:51 |
| 0:04:08     | N Walnut Branch Rd           | 0:59:15 |
| 0:05:08     | Baron Cameron Ave            | 0:58:21 |
| 0:05:34     | New Dominion Pkwy            | 0:57:30 |
| 0:06:43     | Sunset Hills Rd Ramp         | 0:57:01 |
| 0:09:41     | VA-267 WB Ramps              | 0:56:19 |
| 0:10:15     | VA-267 EB Ramps              | 0:55:58 |
| 0:11:38     | Sunrise Valley Dr            | 0:54:23 |
| 0:13:10     | Fox Mill Rd                  | 0:53:06 |
| 0:17:38     | W Ox Rd                      | 0:51:07 |
| 0:21:21     | Franklin Farm Rd             | 0:49:05 |
| 0:22:05     | Springhaven Dr/ Tuckaway Dr  | 0:47:46 |
| 0:22:28     | Stringfellow Rd              | 0:47:24 |
| 0:24:04     | Rugby Rd                     | 0:45:49 |
| 0:24:41     | WB US 50 Off Ramp            | 0:44:46 |
| 0:24:58     | EB US 50 Off Ramp            | 0:44:26 |
| 0:26:09     | Fair Lakes Pkwy              | 0:43:58 |
| 0:27:04     | I-66 WB                      | 0:43:07 |
| 0:27:57     | I-66 EB                      | 0:42:45 |
| 0:32:13     | Lee Hwy                      | 0:42:01 |
| 0:35:38     | Braddock Rd                  | 0:40:41 |
| 0:38:24     | Popes Head Rd                | 0:38:57 |
| 0:40:30     | Burke Centre Pkwy            | 0:35:07 |
| 0:41:47     | Ox Road (Route 123)          | 0:33:32 |
| 0:43:10     | Roberts Pkwy/Karmich St      | 0:31:13 |
| 0:43:49     | Burke Lake Rd                | 0:30:20 |
| 0:44:57     | Old Keene Mill Rd            | 0:28:05 |
| 0:46:25     | Lee Chapel Rd                | 0:26:41 |
| 0:46:52     | Reservation Dr               | 0:26:08 |
| 0:47:49     | Huntsman Blvd                | 0:25:28 |
| 0:49:22     | Pohick Rd                    | 0:22:07 |
| 0:50:36     | Sydenstricker Rd             | 0:18:59 |
| 0:50:59     | Hooes Rd/ Whittlers Creek Dr | 0:16:51 |
| 0:51:34     | Rolling Rd                   | 0:15:52 |
| 0:51:47     | Franconia-Springfield Pkwy   | 0:14:23 |
| 0:53:30     | Boudinot Dr                  | 0:10:41 |
| 0:54:03     | I-95 Overpass                | 0:10:02 |
| 0:54:47     | Loisdale Rd/ I-95 Off Ramp   | 0:09:47 |
| 0:55:22     | Terminal Rd                  | 0:08:55 |
| 0:55:48     | Backlick Rd                  | 0:06:52 |
| 0:56:41     | Telegraph Rd                 | 0:04:01 |
| 0:58:13     | John J Kingman/ Farrar Dr    | 0:01:50 |
| 1:00:32     | Richmond Hwy (US 1)          | 0:00:00 |
| EB          |                              | WB      |
| 0:00:00     | Rolling Rd                   | 0:06:54 |
| 0:01:52     | Spring Village Dr            | 0:05:20 |
| 0:03:18     | I-95                         | 0:03:57 |
| 0:05:56     | Beulah St                    | 0:00:00 |

Figure 5: Existing (2014) PM Travel Time, Speed, and Traffic Volumes

## EXISTING TRANSIT CONDITIONS

Transit service is provided within the study corridor by the Fairfax Connector and WMATA. The Fairfax Connector is operated by MV Transit under a contract with FCDOT. **Figure 6** depicts the transit service routes current as of March 2016.

### 3.4.1. Transit Route Service Operations

Service on Metrobus routes that travel through the corridor varies throughout the week. Monday through Friday, a number of routes operate in the peak direction only (i.e. northbound/eastbound in the AM peak period, southbound/westbound in the PM peak period). In general, Metrobus headways are between 20 and 30 minutes during peak commuting periods. For routes that continue to operate in between peak commuting periods, headways increase to one hour. Weekend service on Metrobus is limited to routes that travel along the I-66 and Dulles Toll Road corridors, operating on one hour headways. No Metrobus service is provided in the Springfield area of the corridor on weekends.

Fairfax Connector routes operate similarly to Metrobus routes. Several routes operate on a weekday peak direction schedule only, with no off-peak direction, midday, or weekend service. Buses operate at 20 to 30 minute headways along the majority of routes during peak periods. The Route 395 schedule along Fairfax Connector routes between Springfield and the Pentagon changes significantly to match demand throughout the peak period, fluctuating between 10 and 30 minute headways. Midday service headways increase to intervals of 40 to 70 minutes depending on the route.



*Exhibit 9: Fairfax Connector bus servicing the Franconia-Springfield Metrorail Station*

### 3.4.2. Park and Ride Lots

Six park and ride lots are located within close proximity to Fairfax County Parkway. Data was collected by Rummel, Klepper & Kahl, LLP (RK&K) for five of these lots between May 7 and May 13, 2014 as part of the Fairfax County Parkway (Route 286) Data Collection Technical Memorandum. The data, summarized in **Table 2**, shows that two of the lots, both maintained by VDOT, are functioning at full capacity (>97 percent) and two, maintained by Fairfax County, are functioning far below capacity (<15 percent). Both of the lots operating at full capacity serve Fairfax Connector Route 305, with one of the two also serving Route 395. According to the data prepared by RK&K, the two lots operating below capacity that are maintained by Fairfax County had no signage indicating that they are park and ride lots.

The fifth lot in the data prepared by RK&K was operating at roughly 80 percent of the available capacity for the three days studied. This lot was created as an interim lot and is no longer in use as a park and ride and has since been replaced by a 3,300-space parking garage adjacent to the Wiehle-Reston East Metro Station.

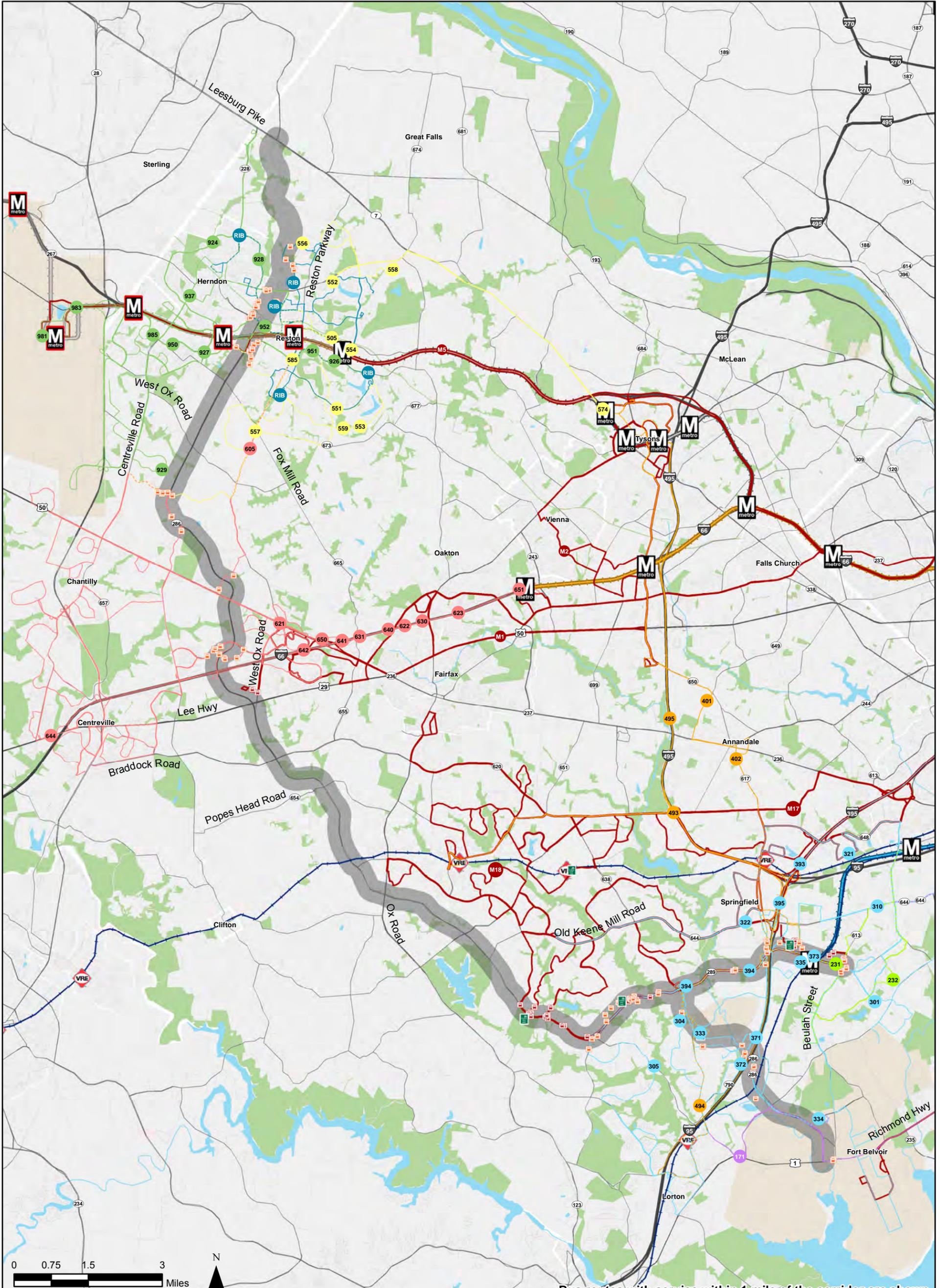
The lot not studied by RK&K is a 515-passenger vehicle capacity parking lot within the Barta Road and Fairfax County Parkway interchange. Construction of this lot was completed in early 2013, with current transit service provided by Fairfax Connector Routes 333, 393, 394, and 494. This lot is maintained by VDOT.

**Figure 6** shows the locations of the park and ride lots within the study area.

**Table 2: Park and Ride Lot Utilization**

|                                 | Total Number of Available Spaces | Lot Utilization (Based on Number of Available Spaces)* |       |       |         |
|---------------------------------|----------------------------------|--|-------|-------|---------|
|                                 |                                  | Day 1  | Day 2 | Day 3 | Average |
| <b>Sunset Hills Interim Lot</b> | 596                              | 83%  | 79%   | 81%   | 81%     |
| <b>Roberts Parkway</b>          | 20                               | 5%   | 5%    | 15%   | 8%      |
| <b>South Run District Run</b>   | 268                              | 6%   | 4%    | 2%    | 4%      |
| <b>Sydenstricker Road</b>       | 177                              | 97%  | 97%   | 98%   | 97%     |
| <b>Gambrill Road</b>            | 232                              | 101%   | 100%  | 101%  | 101%    |

\*Utilization over 100% indicates that vehicles parked in non-designated parking areas



Bus routes with service within 1 mile of the corridor are shown.

|                   |                          |                          |                                 |
|-------------------|--------------------------|--------------------------|---------------------------------|
| <b>Legend</b>     | <b>Fairfax Connector</b> | <b>WMATA</b>             | <b>Virginia Railway Express</b> |
| Bus Stop          | 100 Series               | Metrobus                 | VRE Stations                    |
| Park and Ride Lot | 200 Series               | Blue Line                | Commuter Rail                   |
| Transit Center    | 300 Series               | Orange Line              |                                 |
| Study Area        | 400 Series               | Silver Line              |                                 |
|                   | 500 Series               | Future Silver Line       |                                 |
|                   | 600 Series               | Metrorail Station        |                                 |
|                   | 900 Series               | Future Metrorail Station |                                 |
|                   | RIBS Series              |                          |                                 |

**Figure 11:**  
Transit Service

## EXISTING PEDESTRIAN AND BICYCLE CONDITIONS

Pedestrian and bicycle access is provided through the majority of the study area. An extensive local sidewalk network provides off-street pedestrian access through residential communities adjacent to Fairfax County Parkway and Franconia-Springfield Parkway. The sidewalk network is connected to an extensive shared-use path network that traverses through much of the limits of the study area. **Figure 7** depicts the location of existing sidewalks and trails as of March 2016. Although fairly comprehensive in coverage of the study area, the FCP Trail has a handful of gaps relative to continuity alongside the Parkways. These were identified as a concern by several attendees at the June 2016 public meetings:

- FCP: Sugarland Road to Heather Way (0.5 miles)
- FCP: Monument Drive to Route 29 (2 miles)
- FCP: Burke Center Parkway to Route 123 (1 mile)
- FCP: Stream Way to Loisdale Road (2.5 miles)
- FCP: Backlick Road to Richmond Highway (0.5 miles)

These gaps are relatively short in length and alternative routes along parallel or adjacent facilities are provided for trail users. For this reason and due to cost-prohibitive constructability challenges (e.g. interstate interchanges, shoulder grading), this study has not identified recommendations to address these gaps in trail continuity along the Parkways. More detailed information is presented in Chapter 7 (Corridor Multimodal Short-Term Improvements).

TMC data collected at study intersections captured pedestrian activity along with bicycle and vehicular traffic. In general, non-vehicular traffic was observed to be minimal, with less than 10 pedestrians or bicycles documented on a given approach during a particular hour. In addition to intersection TMCs, bicycle and pedestrian counts were collected at five locations away from study area intersections. Similar to the intersection data, the volume of pedestrians and bicycles was observed to be minimal. The only exception to this was at the Washington and Old Dominion (W&OD) Trail. During a 24-hour period, nearly 200 bicycles and pedestrians were recorded along the trail. Still, the hourly equivalent was less than 20 users of the trail per hour. Overall, pedestrian and bicycle use of facilities along Fairfax County Parkway and Franconia-Springfield Parkway was observed to be relatively low on an hourly basis.

## EXISTING INTELLIGENT TRANSPORTATION SYSTEM (ITS) INFRASTRUCTURE

ITS devices and the supporting communications network serve multiple purposes on a roadway facility. The driver is able to get real-time information about traffic conditions through dynamic message signs (DMS) and view actual roadway conditions through closed circuit television (CCTV) cameras that are often times available for viewing to the public through a web browser or mobile application. The operators of a roadway facility are able to use the same devices to control operations and communicate information to road users. CCTV cameras and roadway sensors can be used to verify roadway conditions and travel speeds; DMS can be used to broadcast travel time information, alerts, or detour information; and high speed information relay is accomplished through a fiber-optic cable network between devices and an operations center.

Along the Parkways, there are five existing CCTV cameras at the following locations:

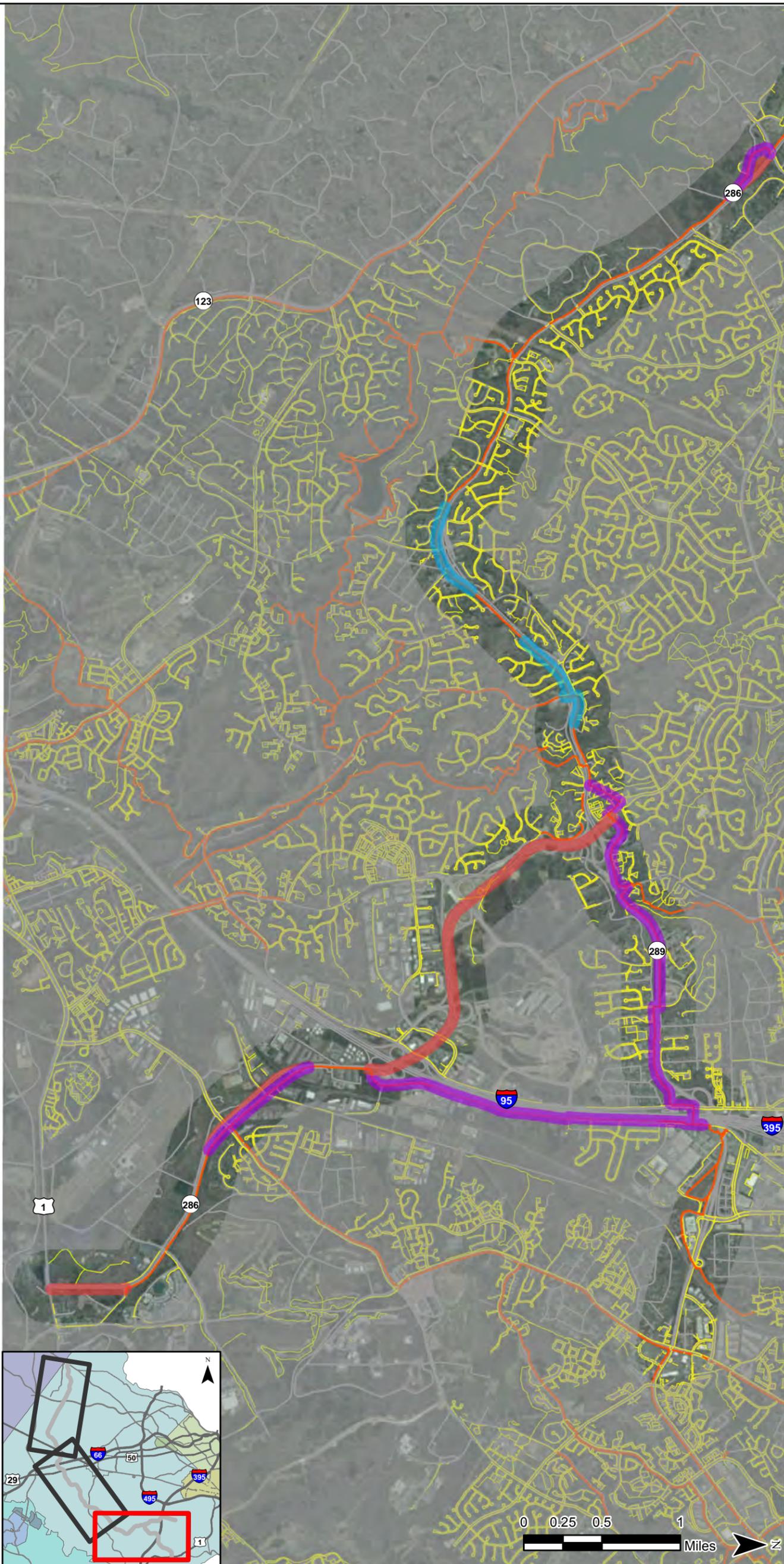
- FCP at Route 7
- FCP at Popes Head Road
- FCP at Route 123
- FCP at Huntsman Boulevard
- FCP at Richmond Highway

In addition to the CCTV cameras, DMS are installed at a few locations to provide motorists with information when traveling along the Parkways:

- Southbound FCP before Monument Drive
- Northbound FCP before Route 29
- Eastbound FSP before Backlick Road

### 3.6.1. ITS Proposal

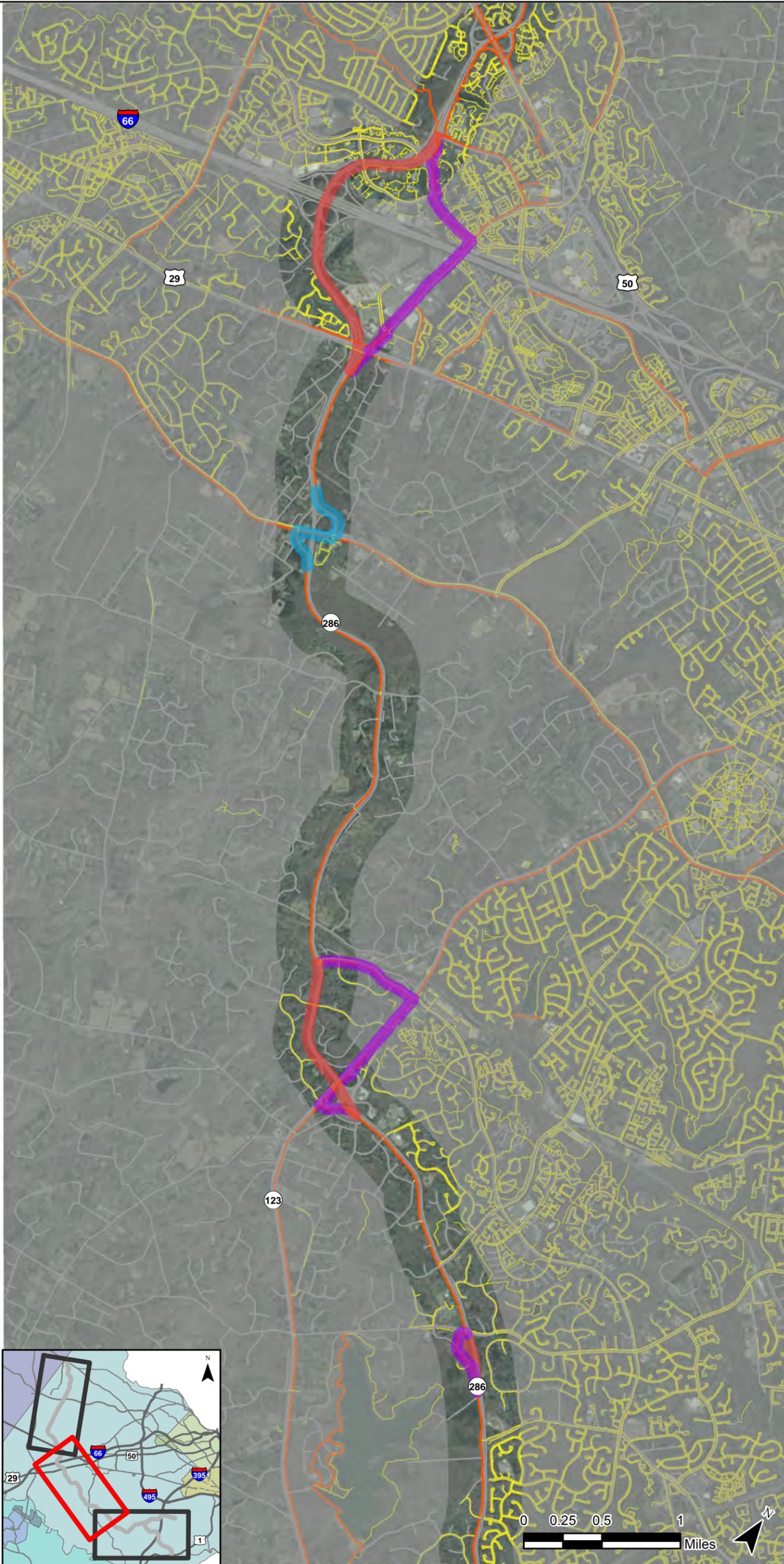
An ITS proposal for the Parkways was prepared in December 2015 to expand the network of existing ITS infrastructure. The proposal summarized the existing equipment locations along with planned and programmed locations for additional equipment. Installation of fiber-optic cable was also identified in the proposal. The purpose of the expansion of equipment is to support incident management, traffic signal operations, and multimodal traveler information dissemination. Traveler information could include travel times, downstream incident information, and parking space availability (where applicable). Altogether, 17 additional CCTV camera locations, three DMS locations, and approximately 11,000 feet of fiber-optic cable installation were identified. Funding has been identified for 10 of the 17 cameras as part of programmatic improvements, but the remaining enhancements are currently unfunded.



**Legend**

- Sidewalk
- Trail
- FCP Trail Diversion Route
- Trail Route Through Interchange
- Missing Segment of the Trail Adjacent to FCP

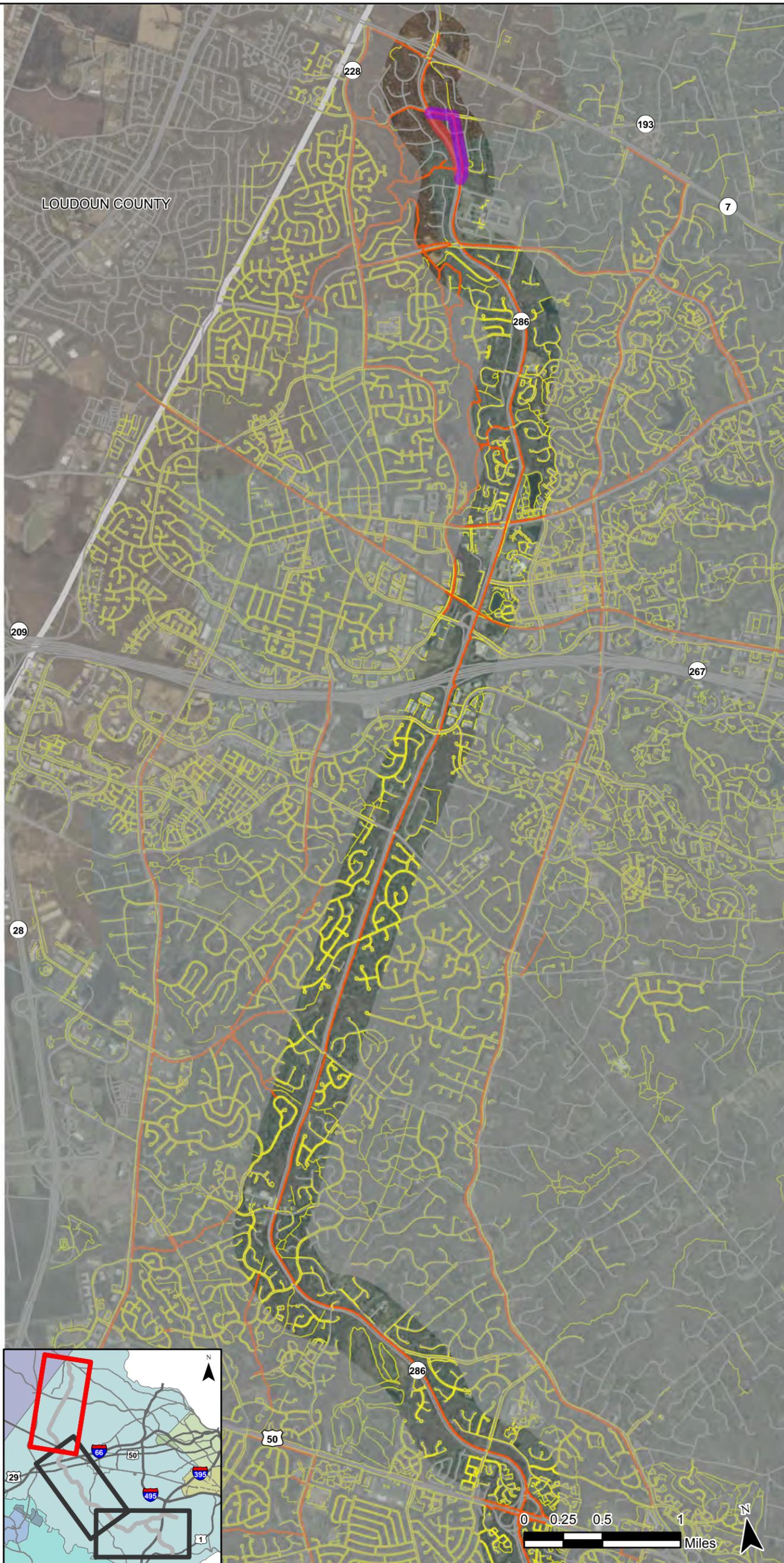
**Figure 12A: Pedestrian Facilities**



**Legend**

- Sidewalk
- Trail
- FCP Trail Diversion Route
- Trail Route Through Interchange
- Missing Segment of the Trail Adjacent to FCP

**Figure 12B: Pedestrian Facilities**



**Legend**

- Sidewalk
- Trail
- FCP Trail Diversion Route
- Trail Route Through Interchange
- Missing Segment of the Trail Adjacent to FCP

**Figure 12C: Pedestrian Facilities**

## 4 EXISTING TRAFFIC OPERATIONS ANALYSIS

### CALCULATION OF TRAFFIC VOLUMES FOR TRAFFIC OPERATIONAL ANALYSES

The traffic volume data collected was reviewed and analyzed for use in the VISSIM traffic operational analyses utilizing the following steps.

#### 4.1.1. Seeding Hour, Peak Hour 1, Peak Hour 2, and Shoulder Peak Hour Traffic Volumes

Typical VISSIM analyses consist of a minimum of two intervals for simulation: a seeding interval and a peak period interval. The duration of these intervals depends on a number of factors, including the size of the study area, traffic volumes, and travel patterns and characteristics. For this study, a third interval (shoulder interval) was required. The three intervals are characterized by the following:

- Seeding interval — intended to distribute traffic throughout the entire network, typically equal to the approximate travel time from one end of the corridor to the other. A 1-hour seeding interval was used for this study. Traffic volumes considered are only a portion of the peak period volumes. For this study, the volumes represent 72 percent of the AM peak hour one data and 90 percent of the PM peak hour one data (see 15-minute traffic volumes section for determination of proportion).
- Peak period interval — period during which the highest traffic volumes are observed (determined based on traffic data) and network congestion occurs. For this study, two hours of data were evaluated, identified as peak hour one and peak hour two. This is not the same as the network peak hour.
- Shoulder interval — intended to allow the network to stabilize after peak period operations and associated congestion. Similar to the seeding interval, traffic volumes are only a portion of the peak period. For this study, the volumes represent 84 percent of the AM peak hour one data and 89 percent of the PM peak hour two data.

The peak hour one and peak hour two data encompass the network peak hour, which straddles the two. Traffic data was evaluated to determine the two peak hours of data, which were identified as shown in **Table 3**. The highest cumulative network volumes were observed during these 2-hour intervals, with the highest hourly volumes noted during the network peak hour. As shown in **Figure 8** and **Figure 9**, the AM peak period exhibits a gradual increase in network volume between 6:30 and 7:30 a.m., with local intersection peak hour volumes peaking earlier at the southern end of the corridor. Hourly network volumes subside at a comparable rate to the increase through the 8:00 a.m. hour. The PM peak period exhibits a similar increase in network volumes until 5:00 p.m., followed by a gradual dissipation in network volume through 5:30 p.m. Similar to the AM, the local peak hour for southern intersections occurs earlier than for the northern locations.

**Table 3: Network Peak Periods and Peak Hours**

|                          | AM Peak Period | PM Peak Period |
|--------------------------|----------------|----------------|
| <b>Seeding Hour</b>      | 6:00 – 7:00    | 3:30 – 4:30    |
| <b>Peak Hour 1</b>       | 7:00 – 8:00    | 4:30 – 5:30    |
| <b>Peak Hour 2</b>       | 8:00 – 9:00    | 5:30 – 6:30    |
| <b>Shoulder Hour</b>     | 9:00 – 10:00   | 6:30 – 7:30    |
| <b>Network Peak Hour</b> | 7:30 – 8:30    | 5:00 – 6:00    |

Figure 8A: AM Intersection Peak Hours

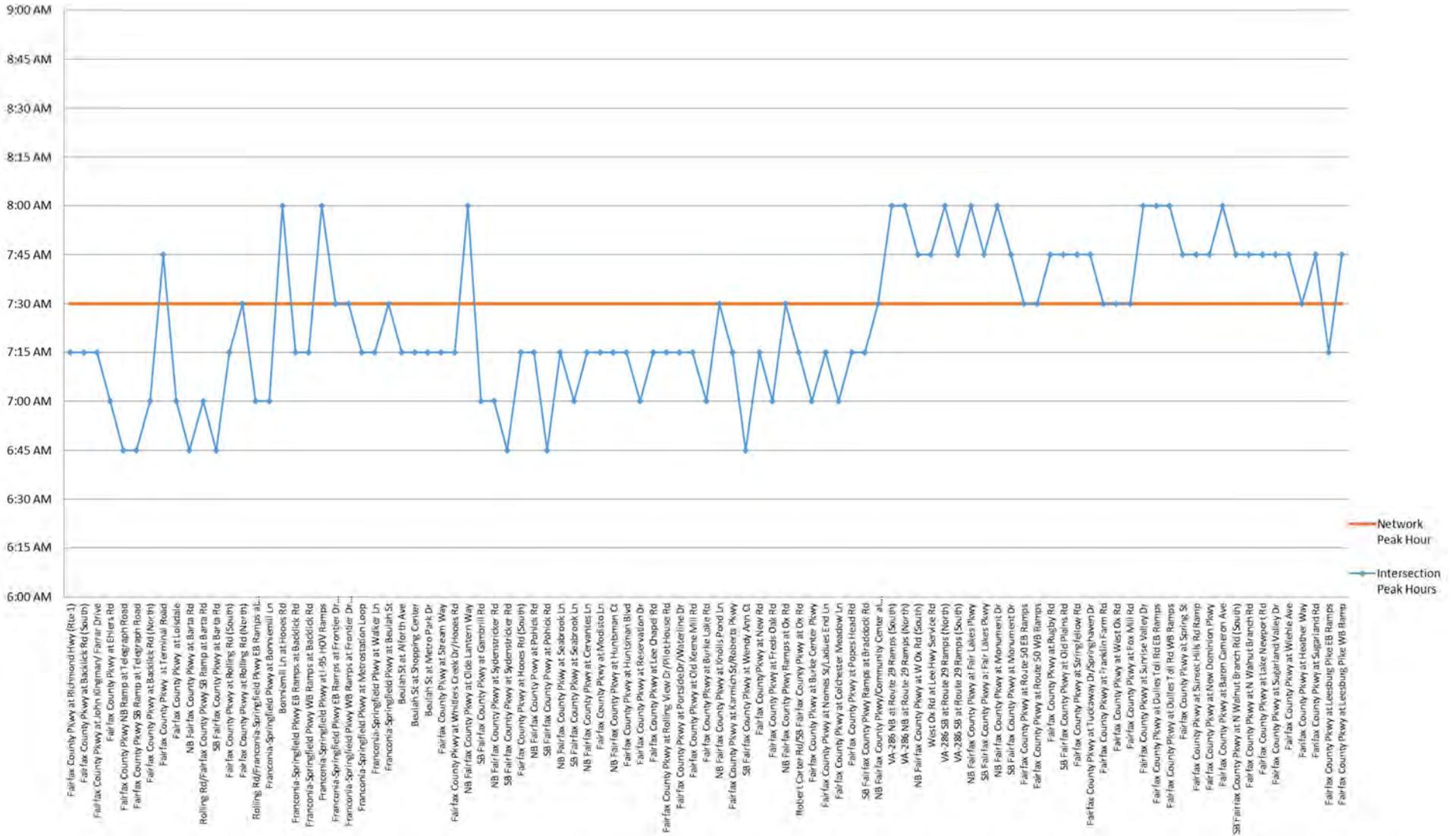
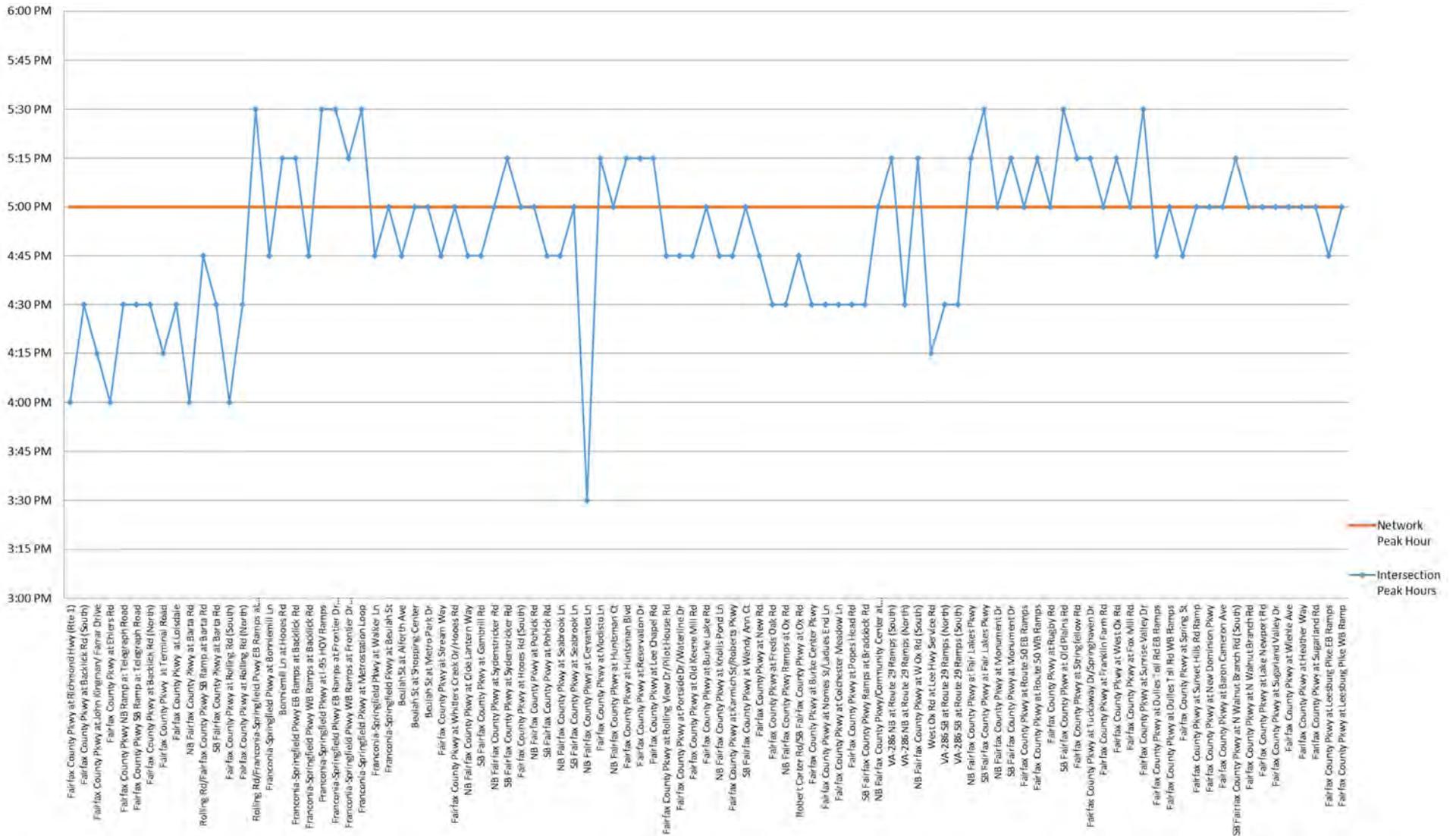
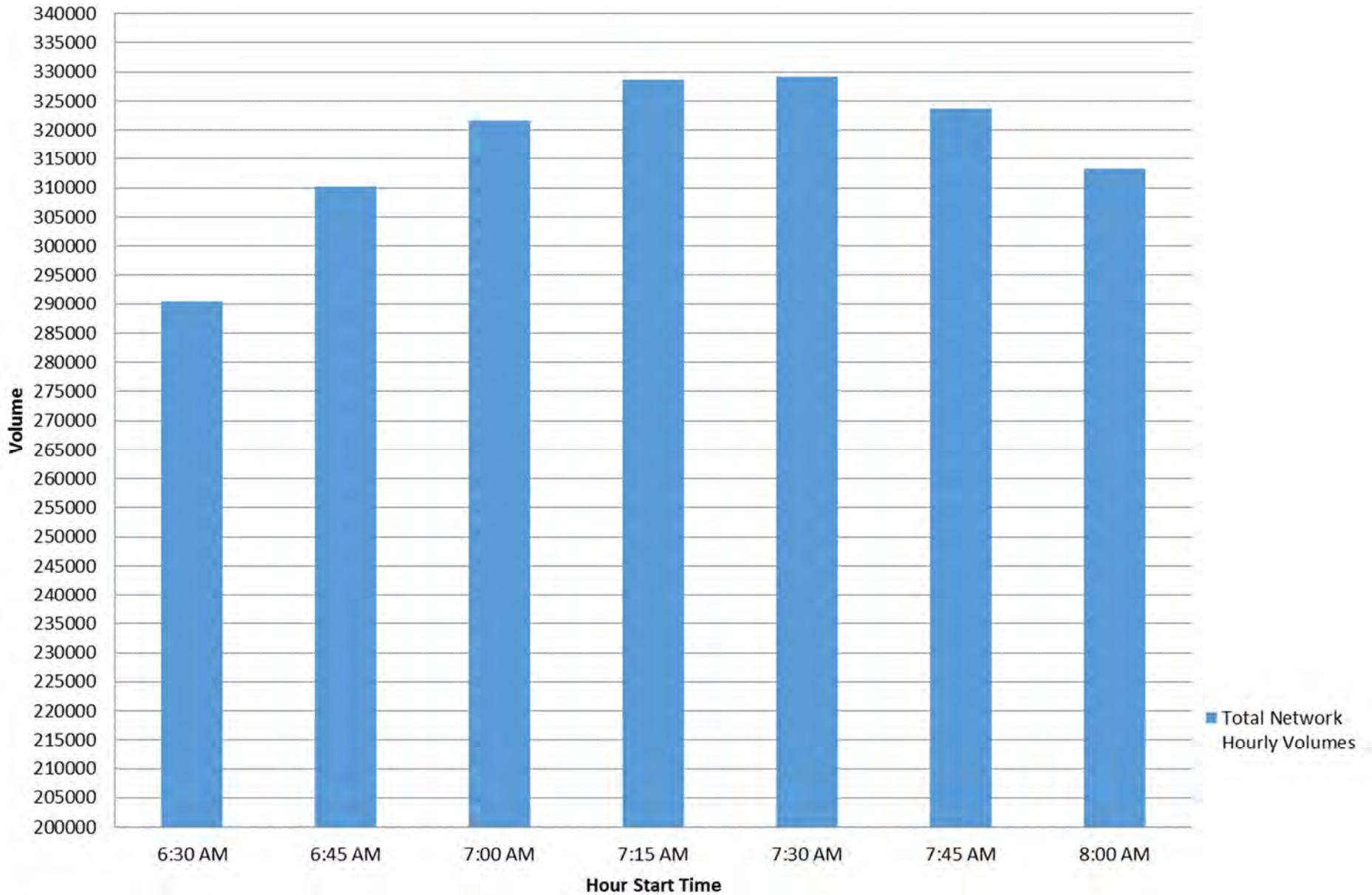


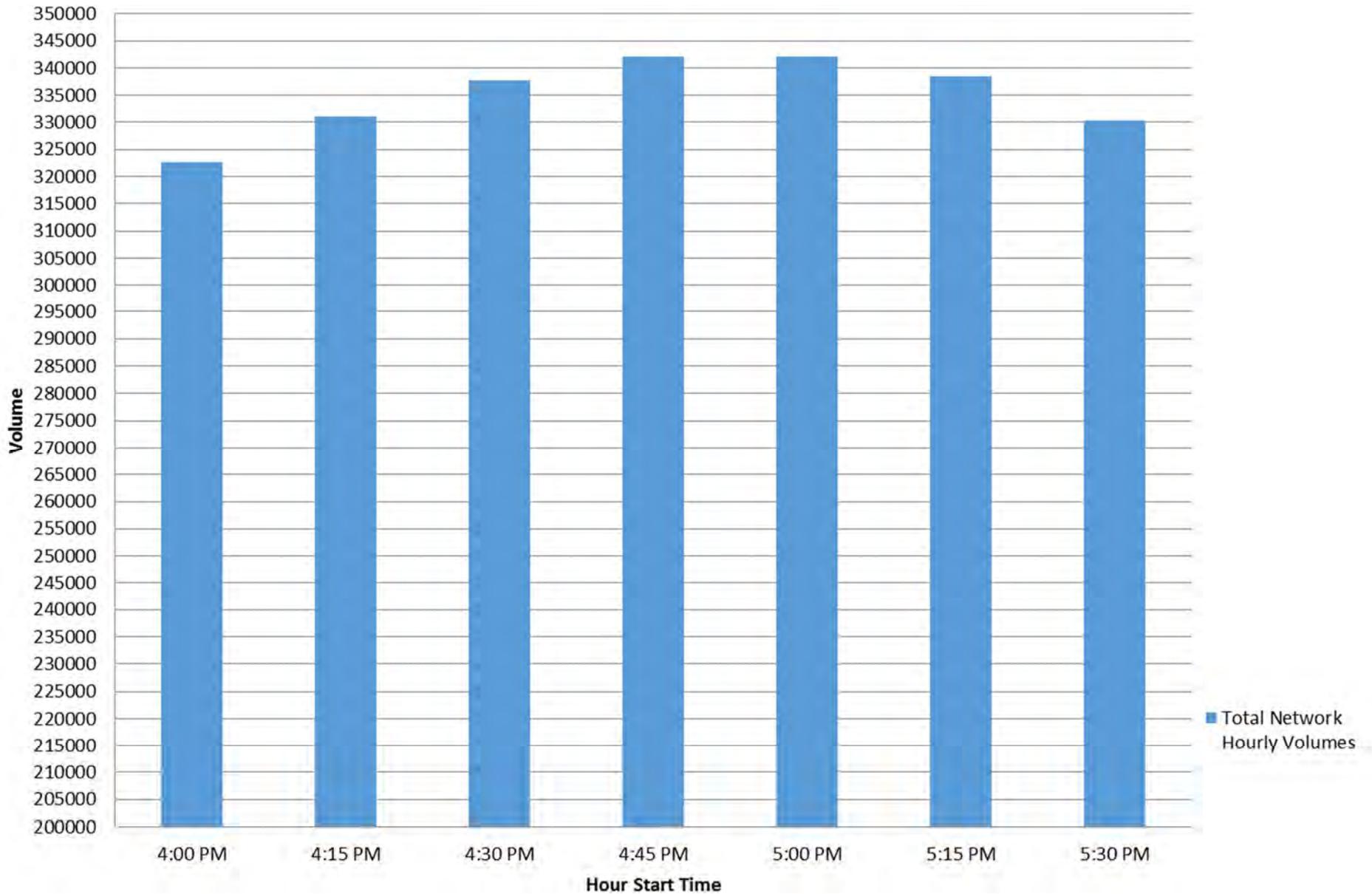
Figure 8B: PM Intersection Peak Hours



**Figure 9A: AM Peak Period Hourly Network Volumes (Peak Hour 7:30 – 8:30 a.m.)**



**Figure 9B: PM Peak Period Hourly Network Volumes (Peak Hour 5:00 – 6:00 p.m.)**



### 4.1.2. Volume Balancing

The data collection effort for Fairfax County Parkway was completed during a period of approximately one month, with a separate effort completed for Franconia-Springfield Parkway approximately, four months later. Variations in traffic volumes between different days of the week resulted in an imbalance between study intersections. While a natural outcome during data collection, the traffic analysis software (VISSIM) is sensitive to volume imbalances, which can have a significant impact on the simulation outputs. For this study, traffic volumes were balanced for each of the peak hours throughout the entire study area. To balance network volumes, a proportional approach was taken to adjust volumes in the forward direction of travel, attempting to limit mainline adjustments to  $\pm 20$  percent and mainline turning movements and side street approach volume adjustments to  $\pm 10$  percent. Consideration was given to make adjustments outside these guiding limitations if the volume was comparable to the turning movement count data included in the Synchro timing plan files provided by VDOT. In addition, the balanced ramp volumes at the I-66 interchange were compared to the equivalent volumes being considered as part of the ongoing I-66 Corridor Improvements project.

A tabular summary of the results of the volume balancing is provided in **Appendix E**. As noted in the tabular summaries, the degree to which these guidelines could be adhered to varied between the four hours. AM peak period hour two was found to have the fewest challenges with respect to volume balancing, with less than 25 individual turning movements adjusted by more than 10 percent of the initial volume. PM peak period hour two presented the greatest number of volume balancing adjustments, with just less than 50 individual turning movements adjusted by more than 10 percent. It is difficult to pinpoint the exact cause for the greater variability in the PM peak period hour 2, as factors including the date of data collection, traffic conditions, and weather influence actual intersection throughput. A concerted effort was made to minimize adjustments outside the established thresholds, as evidenced by the swing in positive and negative adjustments along the mainline in both directions (this is the case for all periods). Overall, the balancing process resulted in a net increase in total study area network volumes in all four hours in the range of two to four percent more than the initial network volume.

### 4.1.3. 15-Minute Traffic Volumes

One of the benefits of using VISSIM is that it is a dynamic software tool capable of simulating traffic operations in shorter intervals than other traditional tools. This provides for a better representation of variable traffic conditions during the course of an hour, which may range from free-flow travel speeds and spare capacity to oversaturated travel conditions, reduced travel speeds, and inadequate capacity. Traffic volumes allow VISSIM to replicate these conditions along with other calibration measures. Fifteen-minute traffic volumes were developed for use in the VISSIM peak period simulations based on the balanced hourly volumes. Considering the 83 intersections of TMC data, local intersection traffic volumes were evaluated to determine the proportion of each 15-minute volume to the total hourly volume. This was done for three consecutive hours of data for the AM and PM peak periods, which allowed for a comparison of the seeding interval volumes to the two peak hours of data. Turning movement count data was considered in lieu of tube count data because it represented a more comprehensive sample of the study area. Unfortunately, TMC data was not available to evaluate the shoulder interval. A similar evaluation was performed using the data from the 14 tube count locations to compare the shoulder intervals to the peak periods.

This evaluation was completed to develop 15-minute traffic volumes as well as identify an appropriate volume adjustment factor to generate seeding and shoulder interval volumes. In doing so, volume balancing was limited to the two peak hours and a consistent approach could be implemented to developing shoulder interval volumes in the absence of actual turning movement count data. **Table 4**

summarizes the selected 15-minute volume distribution factors that were applied to the balanced peak hour volumes. In addition, the adjustment factor used to generate seeding and shoulder interval volumes are indicated in the first column. Adjustment factors were applied to the adjacent peak hour balanced volumes (i.e. seeding interval volumes correspond to peak hour 1, shoulder interval volumes correspond to peak hour 2).

**Table 4: 15-Minute Volume Distribution Factors**

| AM Peak  | Time          | 15-minute Distribution | PM Peak  | Time          | 15-minute Distribution |
|--|---------------|------------------------|--|---------------|------------------------|
| Seeding Hour<br>(72% of AM Peak<br>Period Hour 1)  | 06:00 – 06:15 | 18.2%                  | Seeding Hour<br>(90% of PM Peak<br>Period Hour 1)  | 15:30 – 15:45 | 23.4%                  |
|  | 06:15 – 06:30 | 23.2%                  |  | 15:45 – 16:00 | 24.7%                  |
|  | 06:30 – 06:45 | 27.6%                  |  | 16:00 – 16:15 | 25.2%                  |
|  | 06:45 – 07:00 | 31.0%                  |  | 16:15 – 16:30 | 26.7%                  |
| AM Peak<br>Period Hour 1                           | 07:00 – 07:15 | 23.2%                  | PM Peak<br>Period Hour 1                           | 16:30 – 16:45 | 24.2%                  |
|  | 07:15 – 07:30 | 25.1%                  |  | 16:45 – 17:00 | 24.8%                  |
|  | 07:30 – 07:45 | 25.8%                  |  | 17:00 – 17:15 | 25.1%                  |
|  | 07:45 – 08:00 | 25.9%                  |  | 17:15 – 17:30 | 25.9%                  |
| AM Peak<br>Period Hour 2                           | 08:00 – 08:15 | 26.0%                  | PM Peak<br>Period Hour 2                           | 17:30 – 17:45 | 26.0%                  |
|  | 08:15 – 08:30 | 25.9%                  |  | 17:45 – 18:00 | 25.5%                  |
|  | 08:30 – 08:45 | 24.8%                  |  | 18:00 – 18:15 | 24.5%                  |
|  | 08:45 – 09:00 | 23.3%                  |  | 18:15 – 18:30 | 24.0%                  |
| Shoulder Hour<br>(84% of AM Peak<br>Period Hour 2) | 09:00 – 09:15 | 26.3%                  | Shoulder Hour<br>(89% of PM Peak<br>Period Hour 2) | 18:30 – 18:45 | 27.0%                  |
|  | 09:15 – 09:30 | 26.0%                  |  | 18:45 – 19:00 | 27.0%                  |
|  | 09:30 – 09:45 | 24.6%                  |  | 19:00 – 19:15 | 24.7%                  |
|  | 09:45 – 10:00 | 23.1%                  |  | 19:15 – 19:30 | 21.3%                  |

#### 4.1.4. Heavy Vehicles

The average passenger vehicle is capable of accelerating and decelerating at high rates of speed and can maneuver through a traffic network with ease. Heavy vehicles such as box trucks and tractor-trailers operate differently than typical passenger vehicles and could have an impact on traffic operations if they were to constitute a significant portion of the network traffic volumes. An assessment of heavy vehicle percentages was completed for each study intersection of the heavy vehicle percentages, which were documented during the data collection process for each movement. The data indicates an overall low percentage of heavy vehicles in the study area. As such, the heavy vehicle percentages from the TMC data was used unless they were below two percent, in which case a minimum value of two percent was used.

In many cases of a heavy vehicle percentage greater than two percent, the volume along the approach was low and therefore directly affected by the presence of a nominal volume of heavy vehicles. While significant for the approach (typically a side street approach), the influence on heavy vehicle percentages at downstream intersections was low considering the significant volume of traffic along the mainline. As such, no mainline approaches considered a heavy vehicle percentage greater than two percent. The following are the side street approaches that demonstrated a higher percentage of heavy vehicles:

- Southbound FCP off-ramp to Telegraph Road
- FCP at Backlick Road (north)
- FCP at Terminal Road

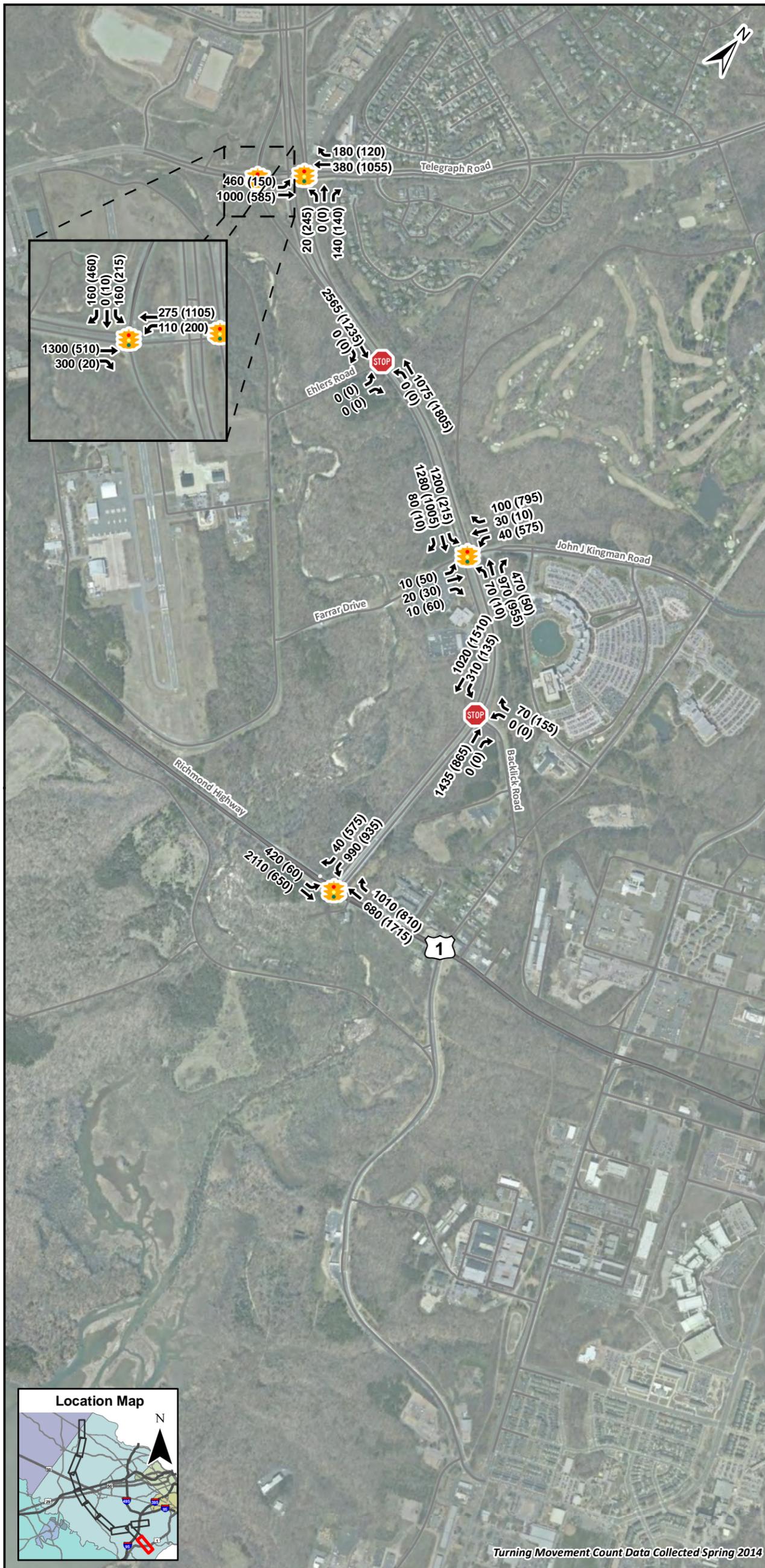
- FCP at Loisdale Road
- Southbound FCP off-ramp to Barta Road

A tabular summary of heavy vehicles by movement is provided in **Appendix B**. The data collection efforts for the FSP corridor did not include documentation of heavy vehicle percentages; thus, the minimum value of two percent was used for all approaches.

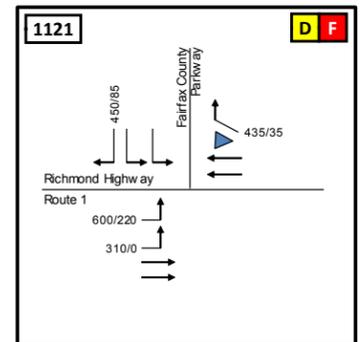
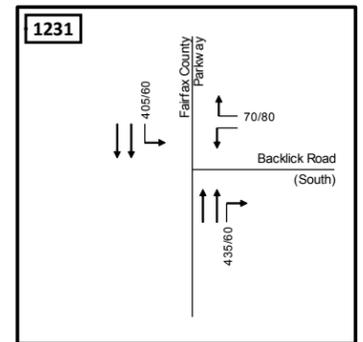
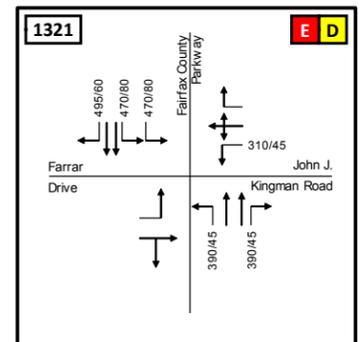
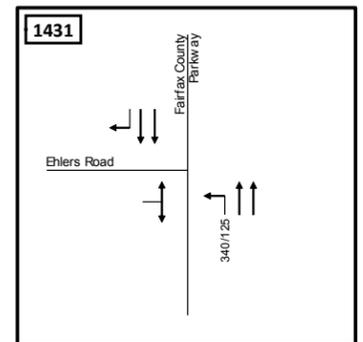
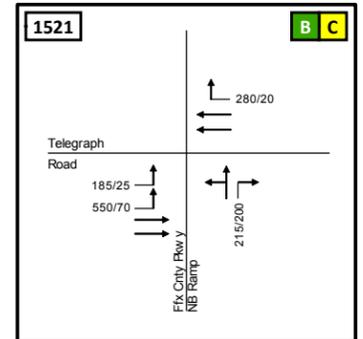
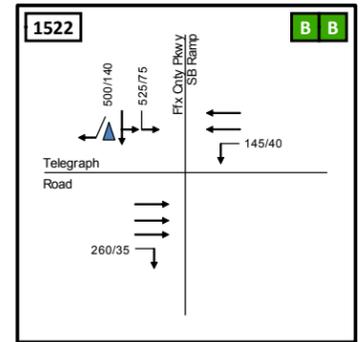
#### 4.1.5. Network Peak Hour Volumes

The end result of the volume balancing and 15-minute interval calculation effort was a set of traffic volumes at study area intersections for each of the sixteen 15-minute intervals included in the 4-hour simulation period for the AM and PM peak periods. As noted in **Table 2**, the network peak hour straddles the two hours that constitute the peak period. To generate the network peak hour volumes, the calculated 15-minute interval volumes for each study intersection that comprise the network peak hour were summed together. These volumes represent the highest hourly network volume in a balanced condition. A review of the network peak hour volumes was completed to identify any imbalances. It was determined that the volumes maintained a reasonable degree of consistency between intersections, with imbalances of no more than 20 vehicles noted. The network peak hour TMCs are summarized in **Figure 10A** through **Figure 10N**.

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
  - AM PM** Intersection LOS A or B
  - AM PM** Intersection LOS C or D
  - AM PM** Intersection LOS E or F
  - Travel Lane
  - ▲ Channelizing Island
  - ## / ## Storage/Taper (feet)
- Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

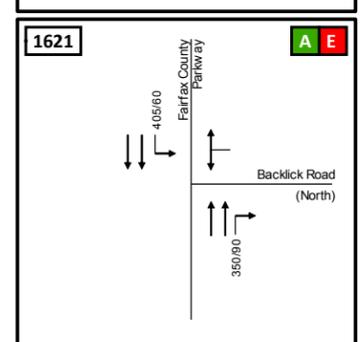
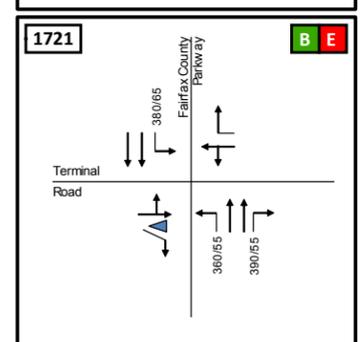
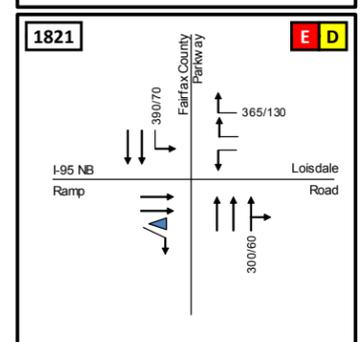
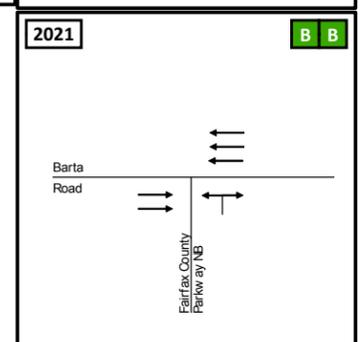
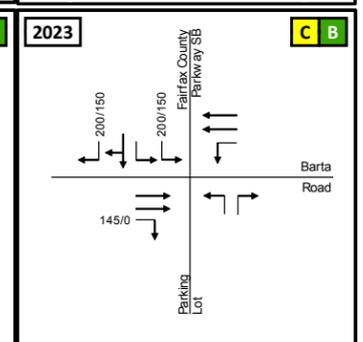
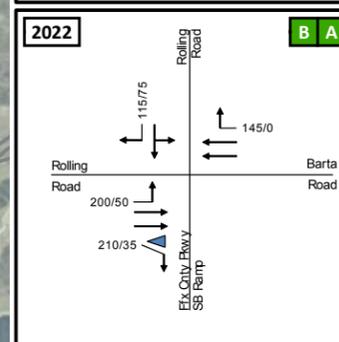
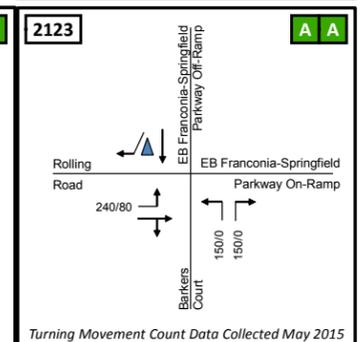
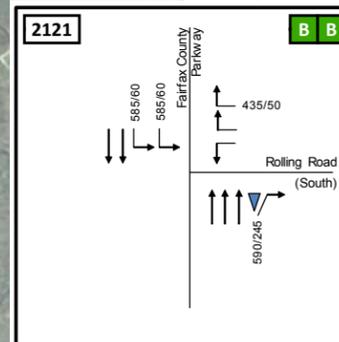
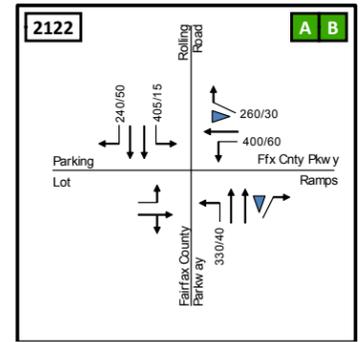
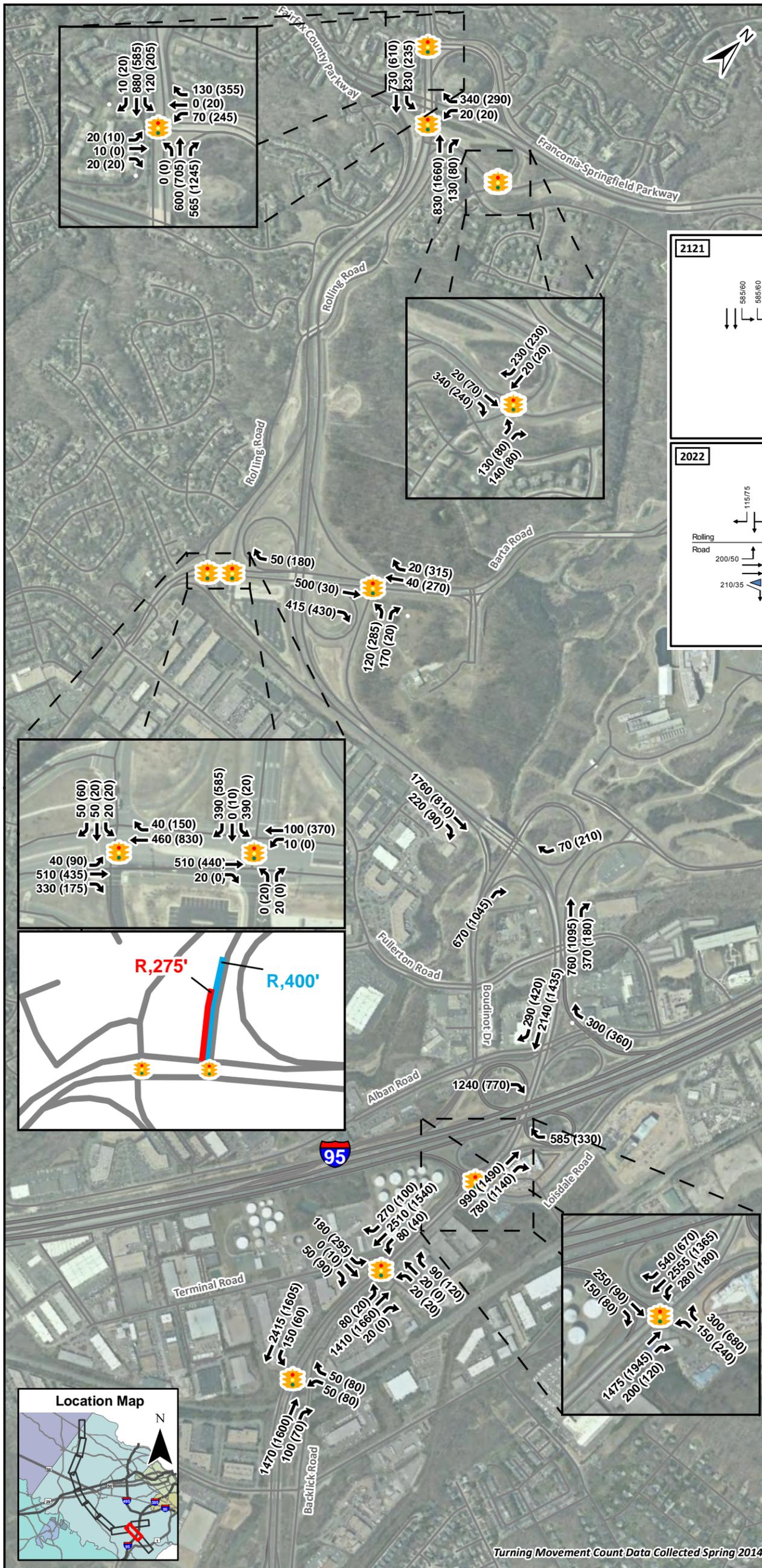
### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

0 500 1,000 2,000 Feet

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

### Intersection Type

- Signalized
- Unsignalized

### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

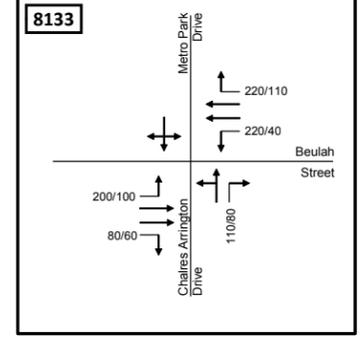
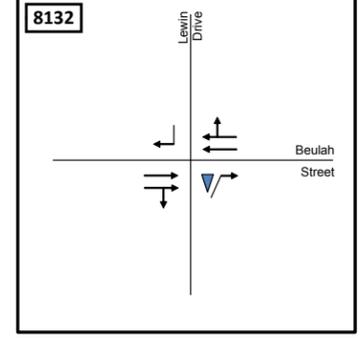
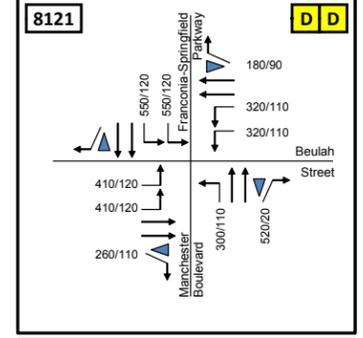
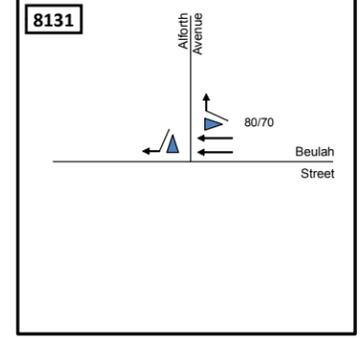
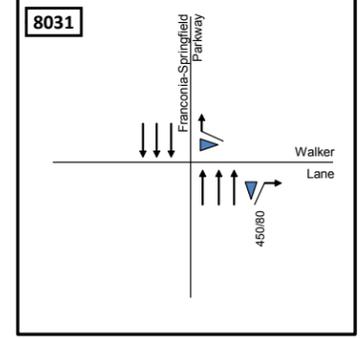
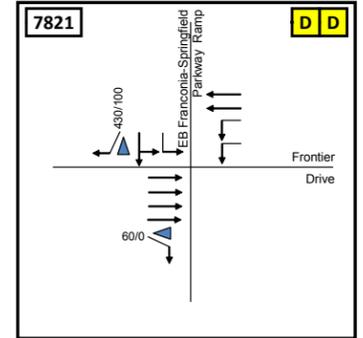
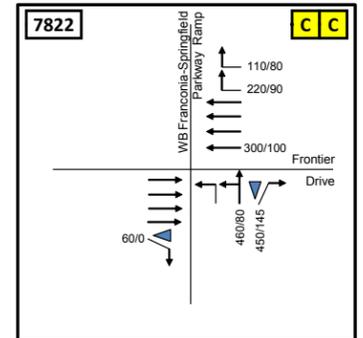
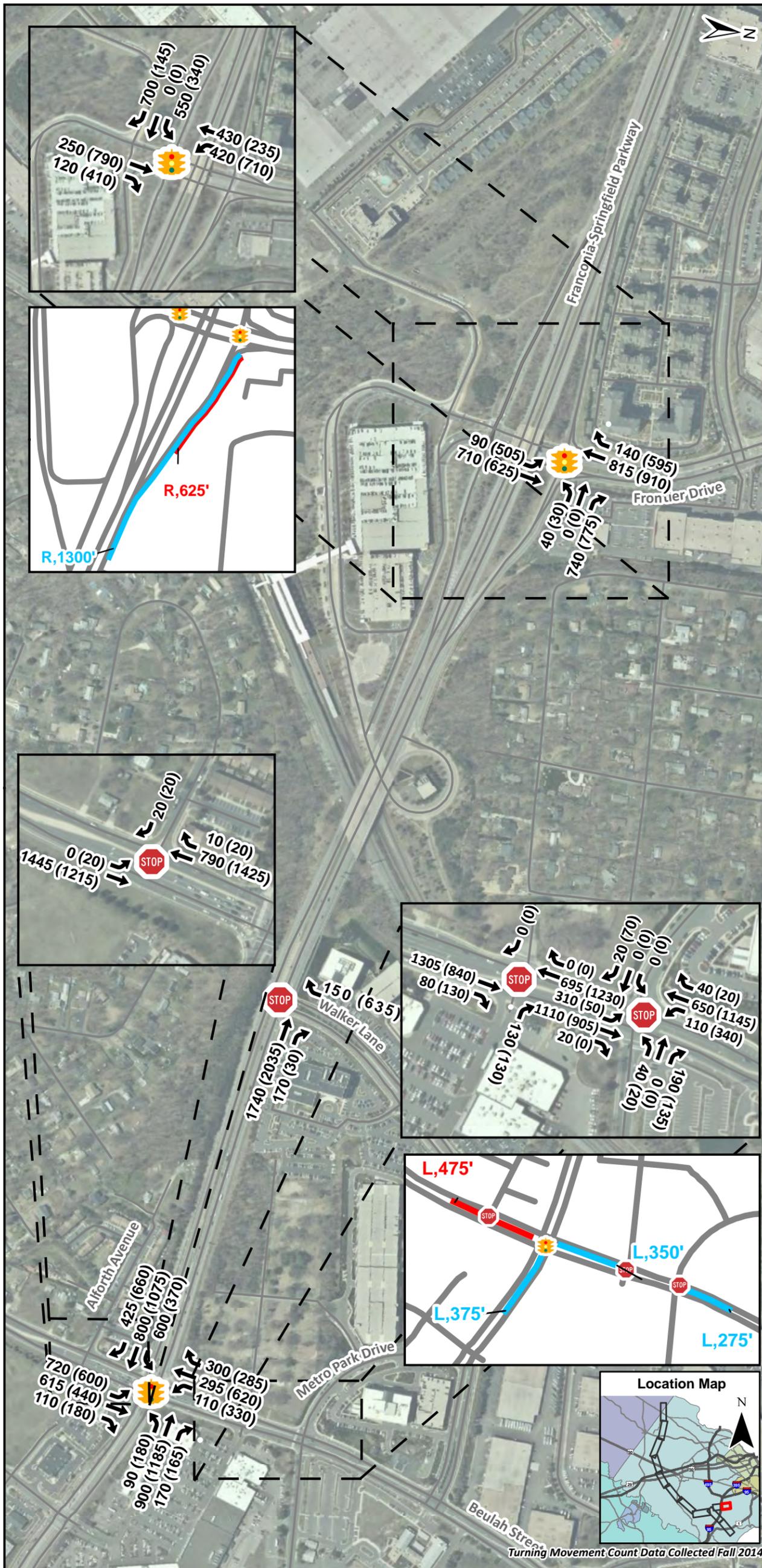
\*Limited to locations where the maximum queue exceeds the available storage



**Figure 10B: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



1121 Intersection ID

AM PM Intersection LOS A or B

AM PM Intersection LOS C or D

AM PM Intersection LOS E or F

Travel Lane

Channelizing Island

## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L, xx' AM Peak
- R/L, xx' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

## Figure 10C: Study Area Intersections Overview

Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

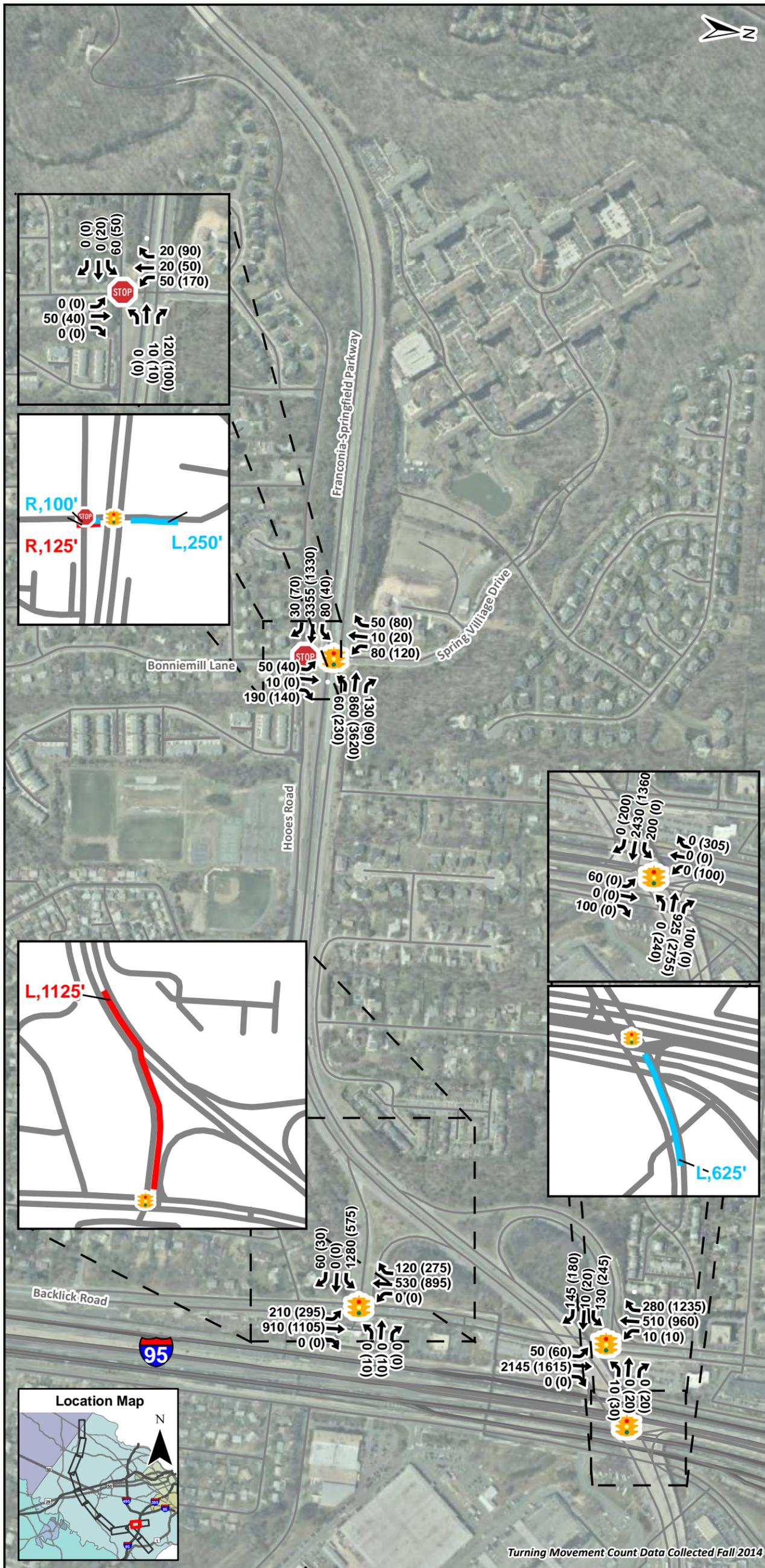


FAIRFAX COUNTY PARKWAY & FRANCONIA-SPRINGFIELD PARKWAY CORRIDOR STUDY

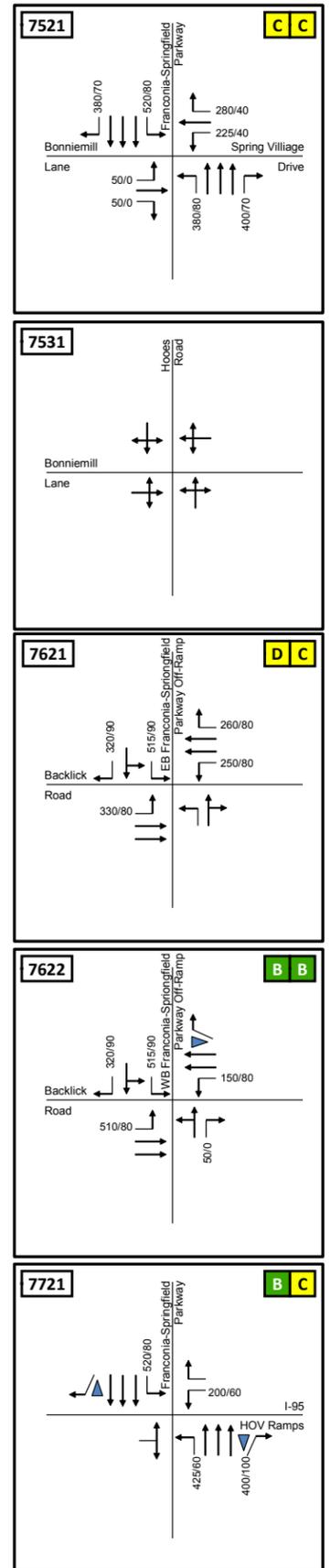


0 500 1,000

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

### Traffic

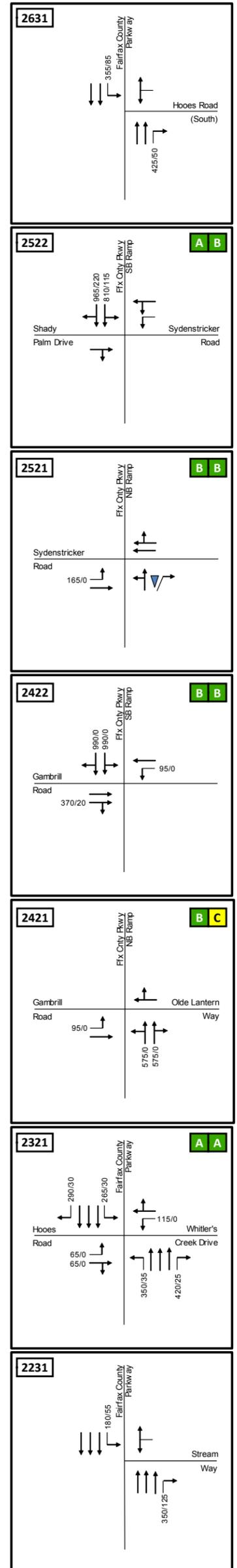
- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

0 250 500 1,000 Feet

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▤ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

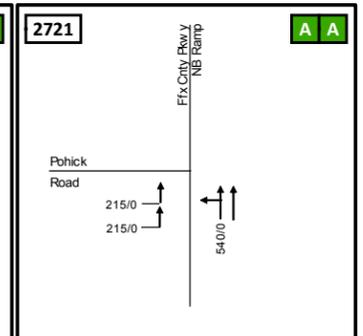
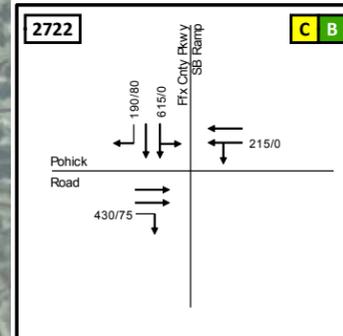
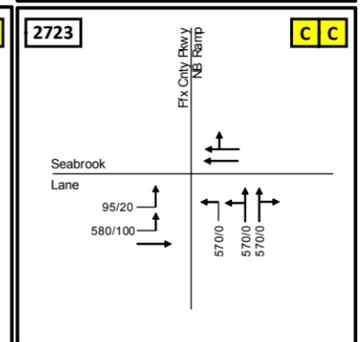
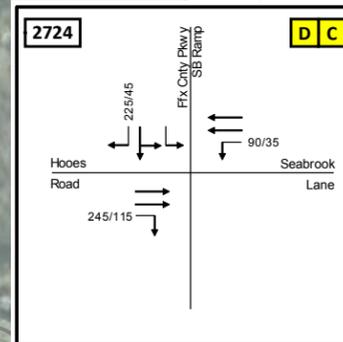
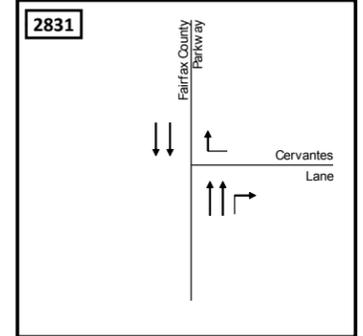
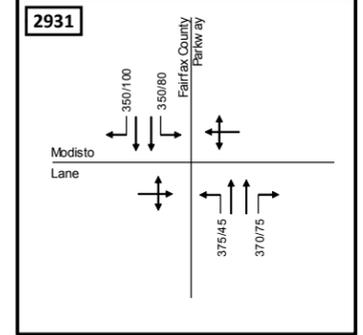
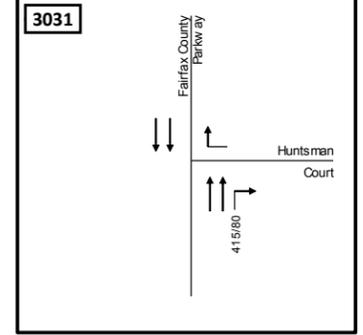
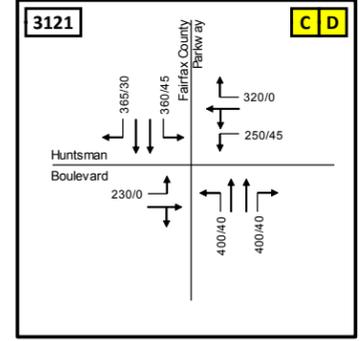
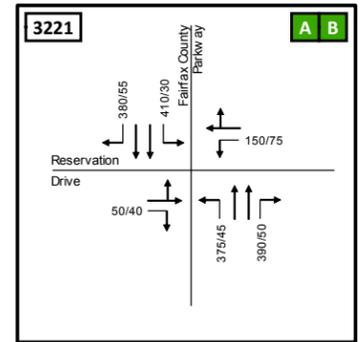
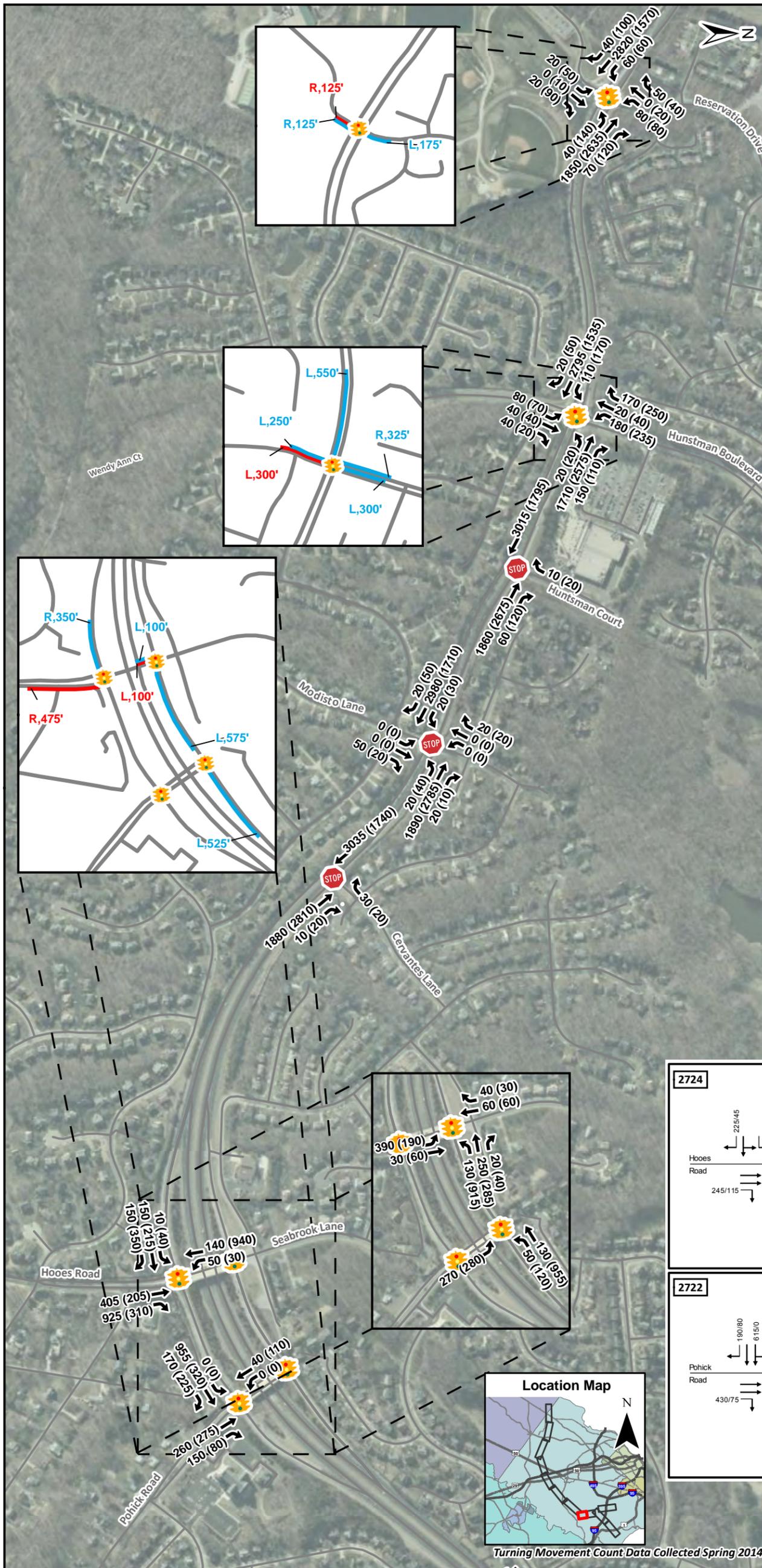
### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

**Figure 10E: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▤ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

**Maximum Observed Queue Length\***

- R/L,XX' AM Peak
- R/L,XX' PM Peak

**Intersection Type**

- Signalized
- Unsignalized

**Traffic**

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

\*Limited to locations where the maximum queue exceeds the available storage

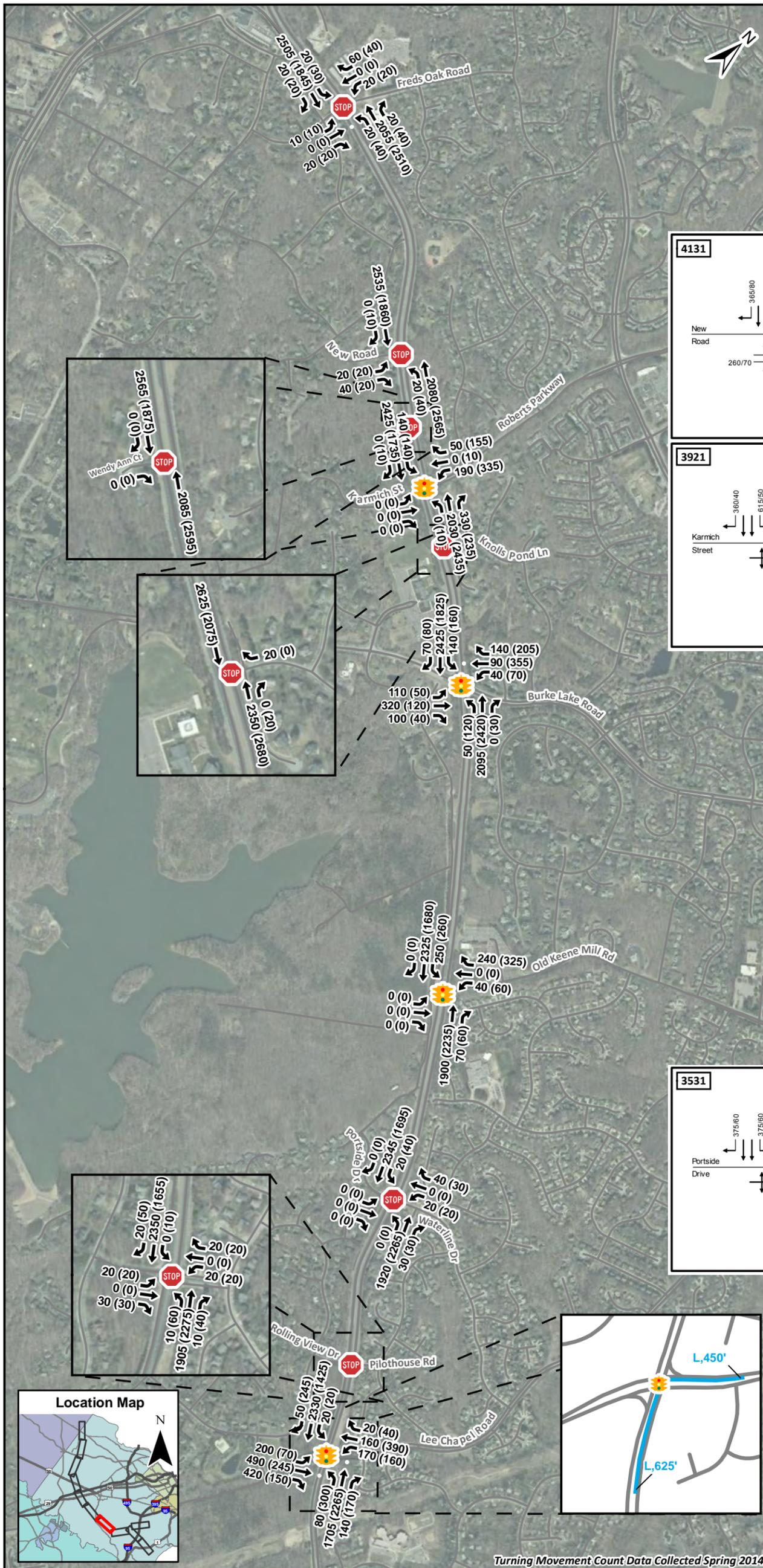
0 250 500 1,000 Feet

**VDOT** **FAIRFAX COUNTY PARKWAY & FRANCONIA-SPRINGFIELD PARKWAY CORRIDOR STUDY** **Kimley Horn**

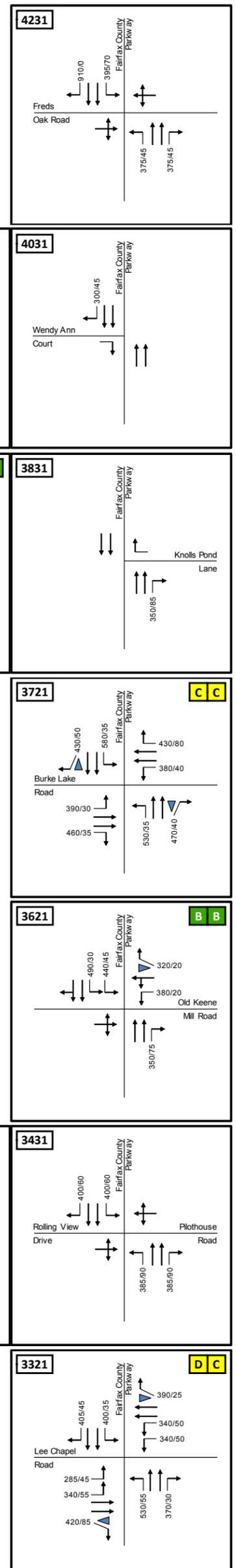
**Figure 10F: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



Turning Movement Count Data Collected/Spring 2014



**1121** Intersection ID  
**AM PM** Intersection LOS A or B  
**AM PM** Intersection LOS C or D  
**AM PM** Intersection LOS E or F  
 → Travel Lane  
 Channelizing Island  
 ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

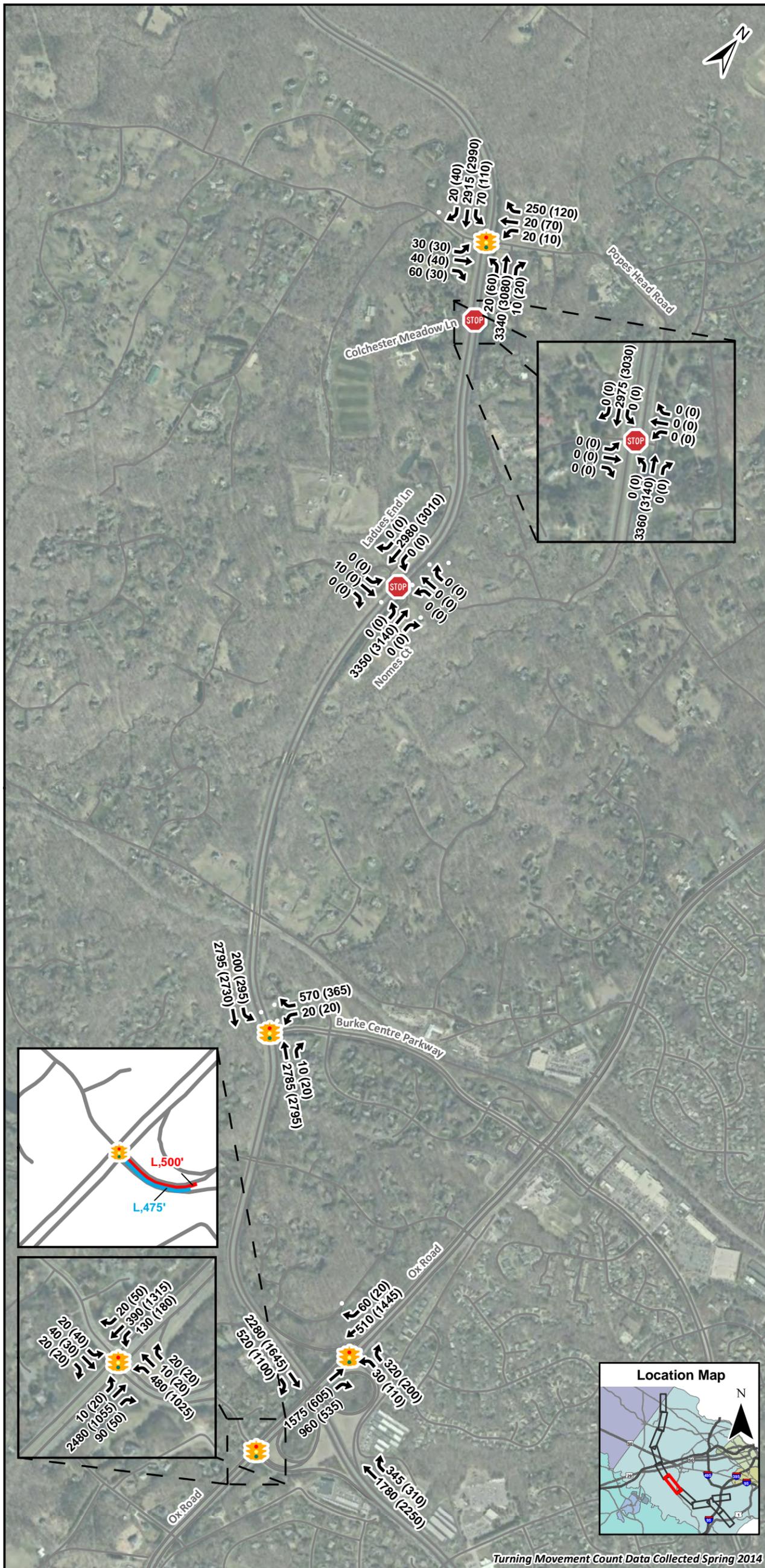
### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

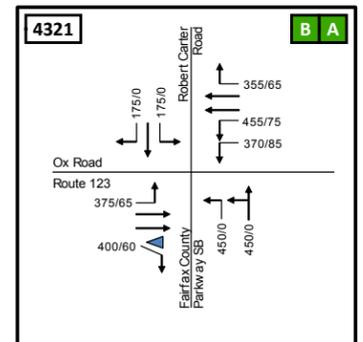
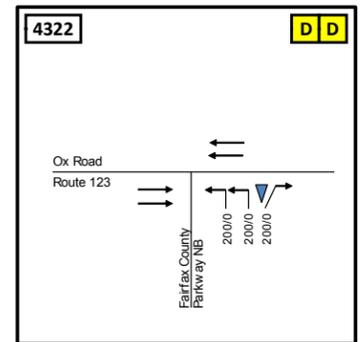
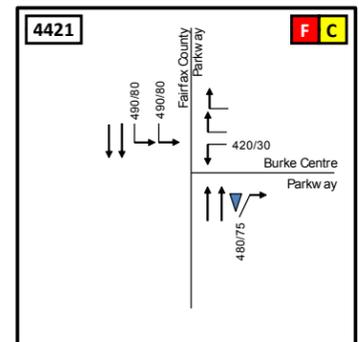
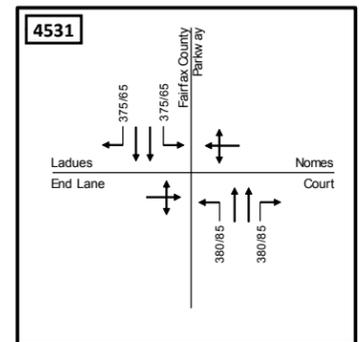
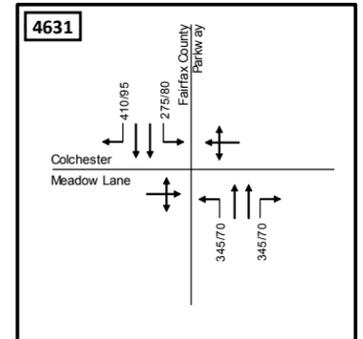
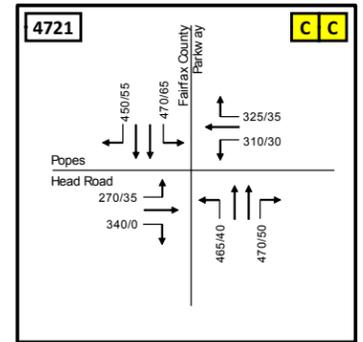


**Figure 10G: Study Area Intersections Overview**  
 Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- ☀ Signalized
- STOP Unsignalized

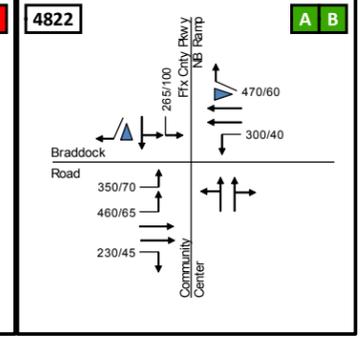
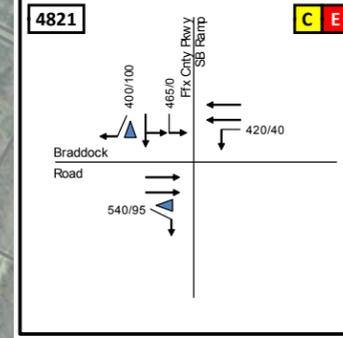
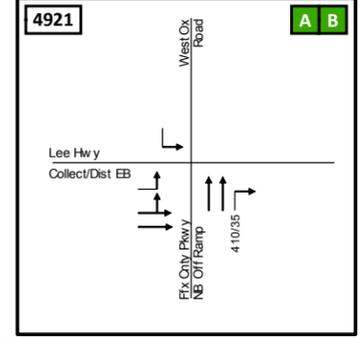
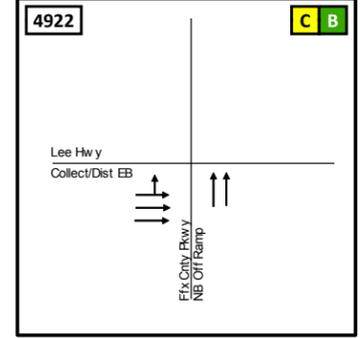
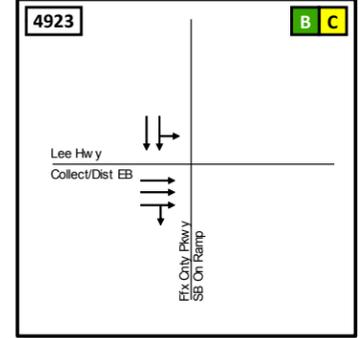
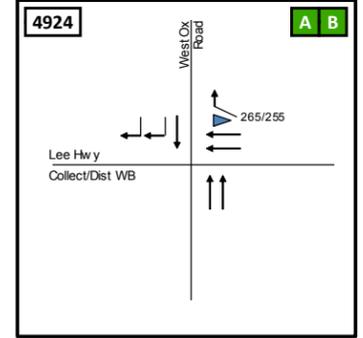
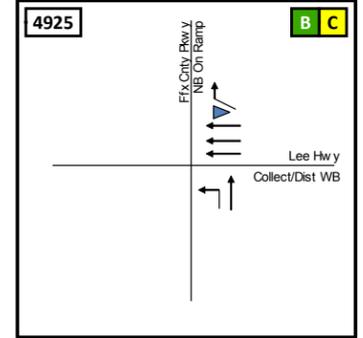
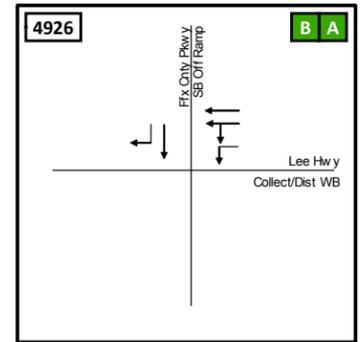
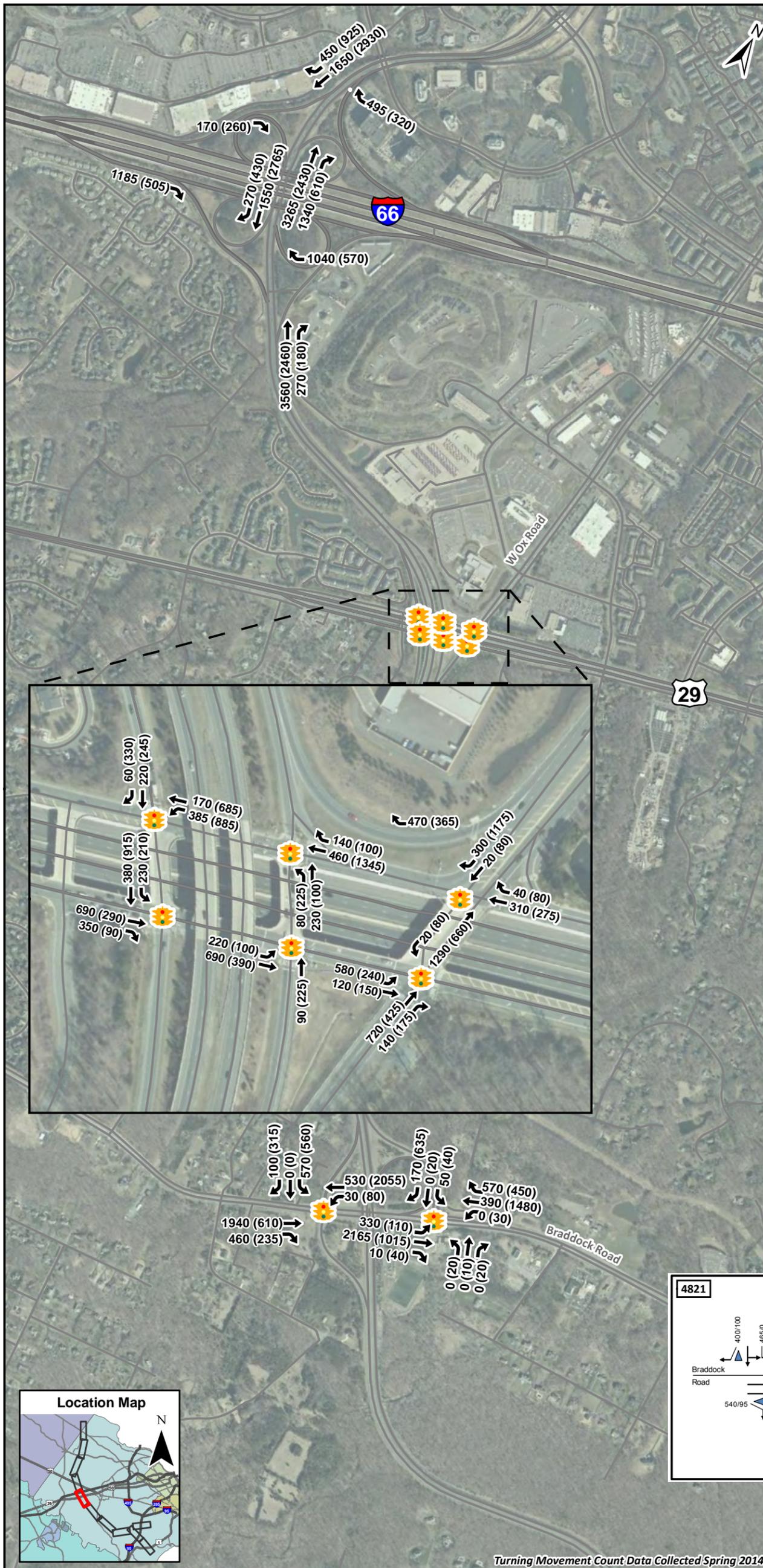
### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

0 500 1,000 2,000 Feet

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- Signalized
- Unsignalized

### Traffic

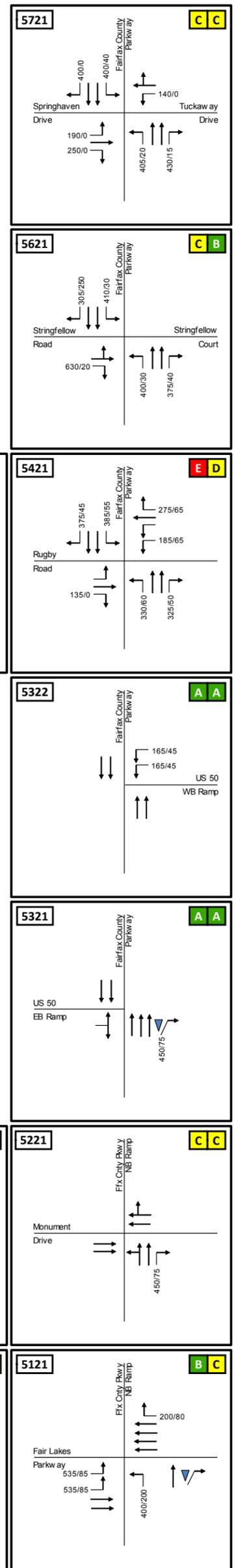
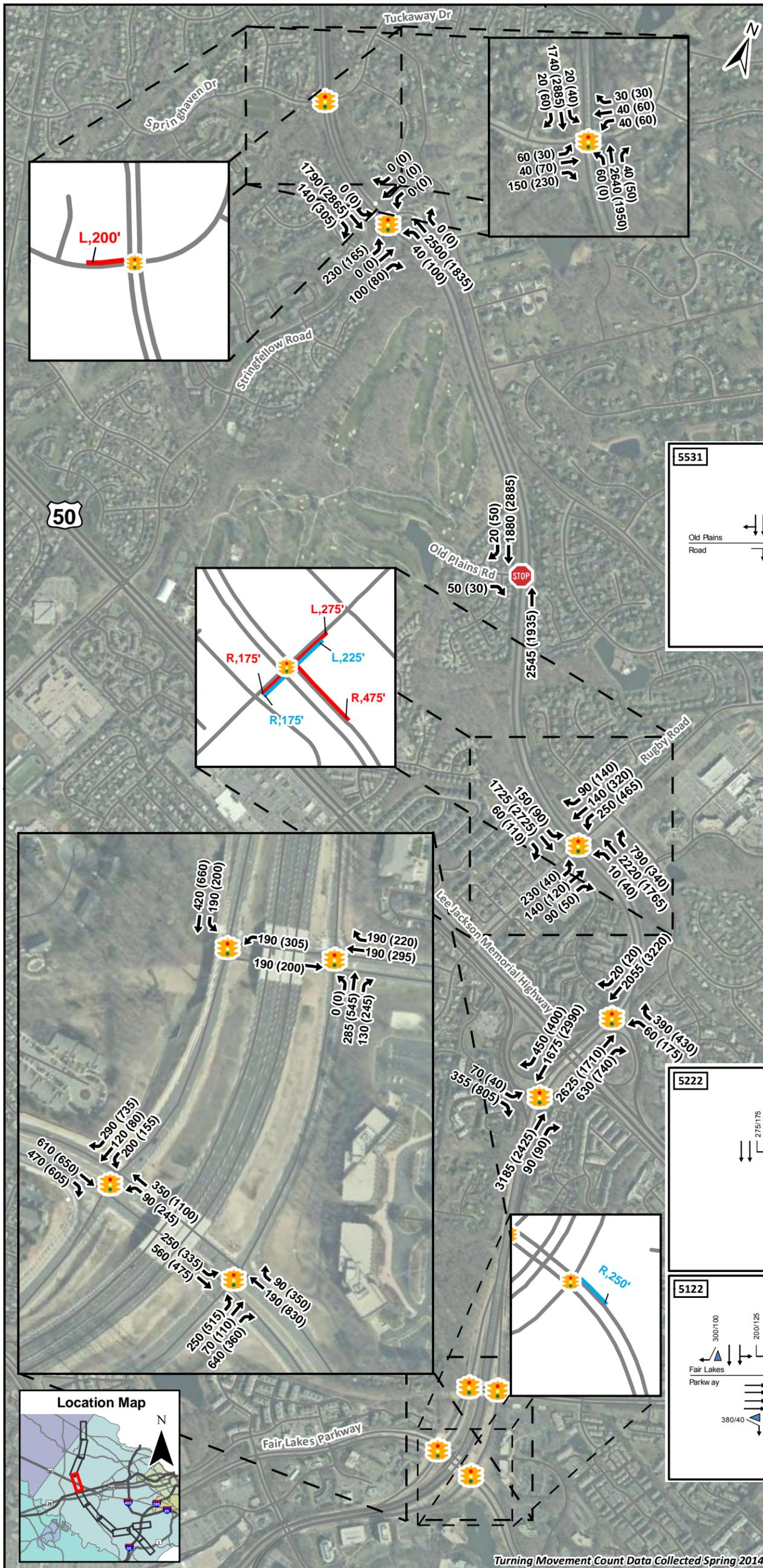
- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count



**Figure 10i: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



**1121** Intersection ID  
**AM PM** Intersection LOS A or B  
**AM PM** Intersection LOS C or D  
**AM PM** Intersection LOS E or F

→ Travel Lane  
 Channelizing Island  
 ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

### Intersection Type

- Signalized
- Unsignalized

### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

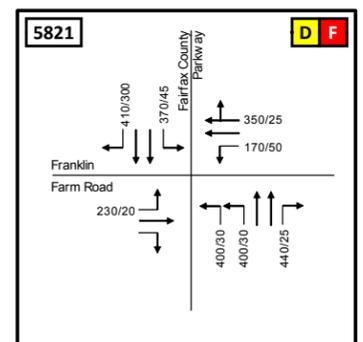
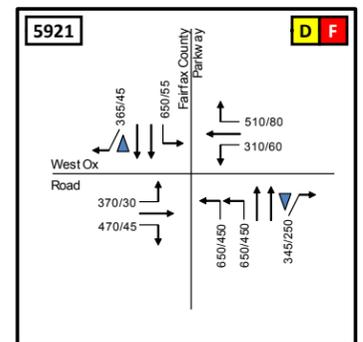
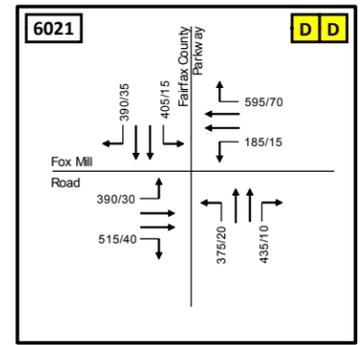
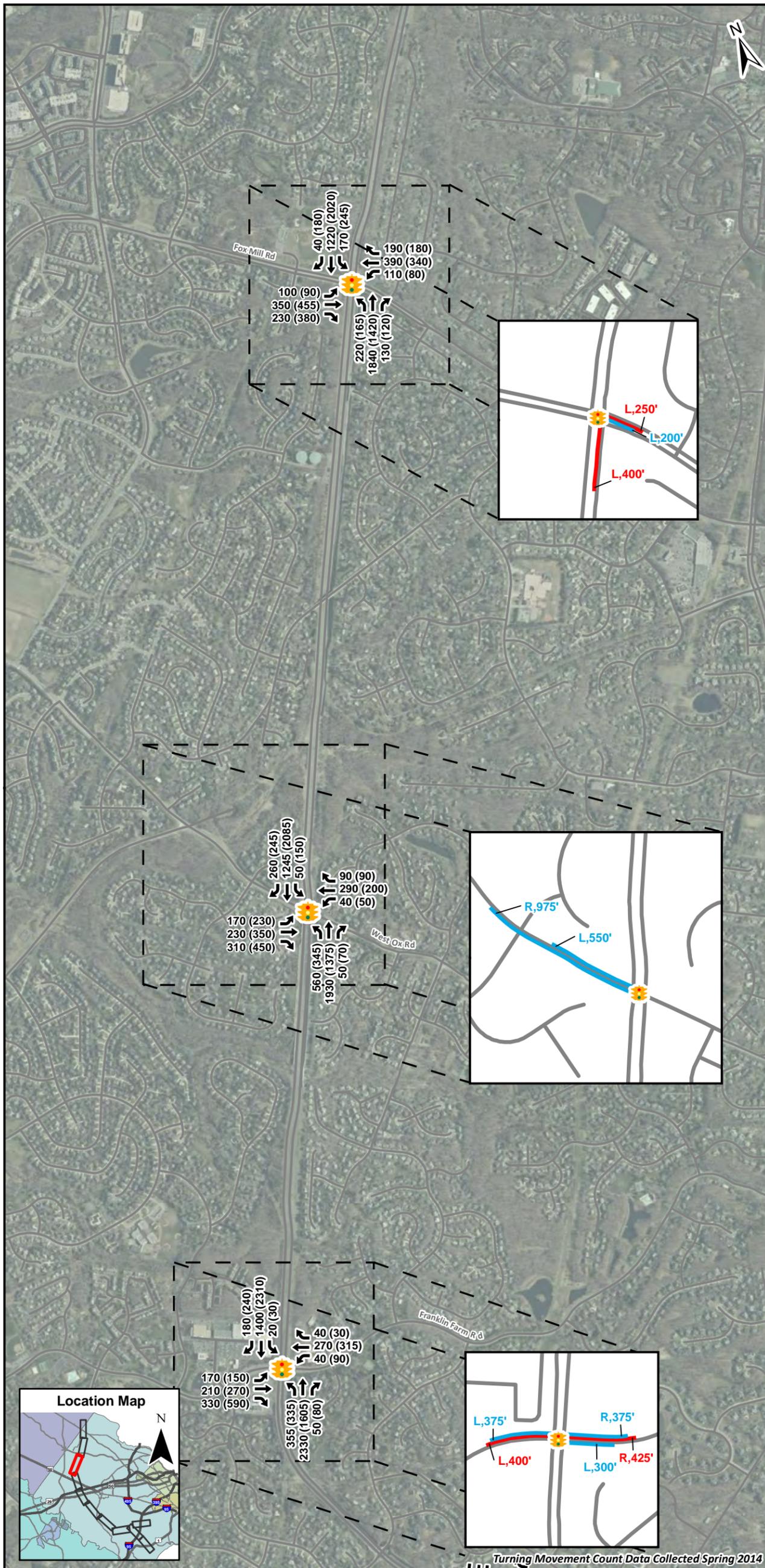
\*Limited to locations where the maximum queue exceeds the available storage



**Figure 10J: Study Area Intersections Overview**  
 Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



- 1121 Intersection ID
- AM PM Intersection LOS A or B
- AM PM Intersection LOS C or D
- AM PM Intersection LOS E or F
- Travel Lane
- Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

**Maximum Observed Queue Length\***

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

**Intersection Type**

- Signalized
- Unsignalized

**Traffic**

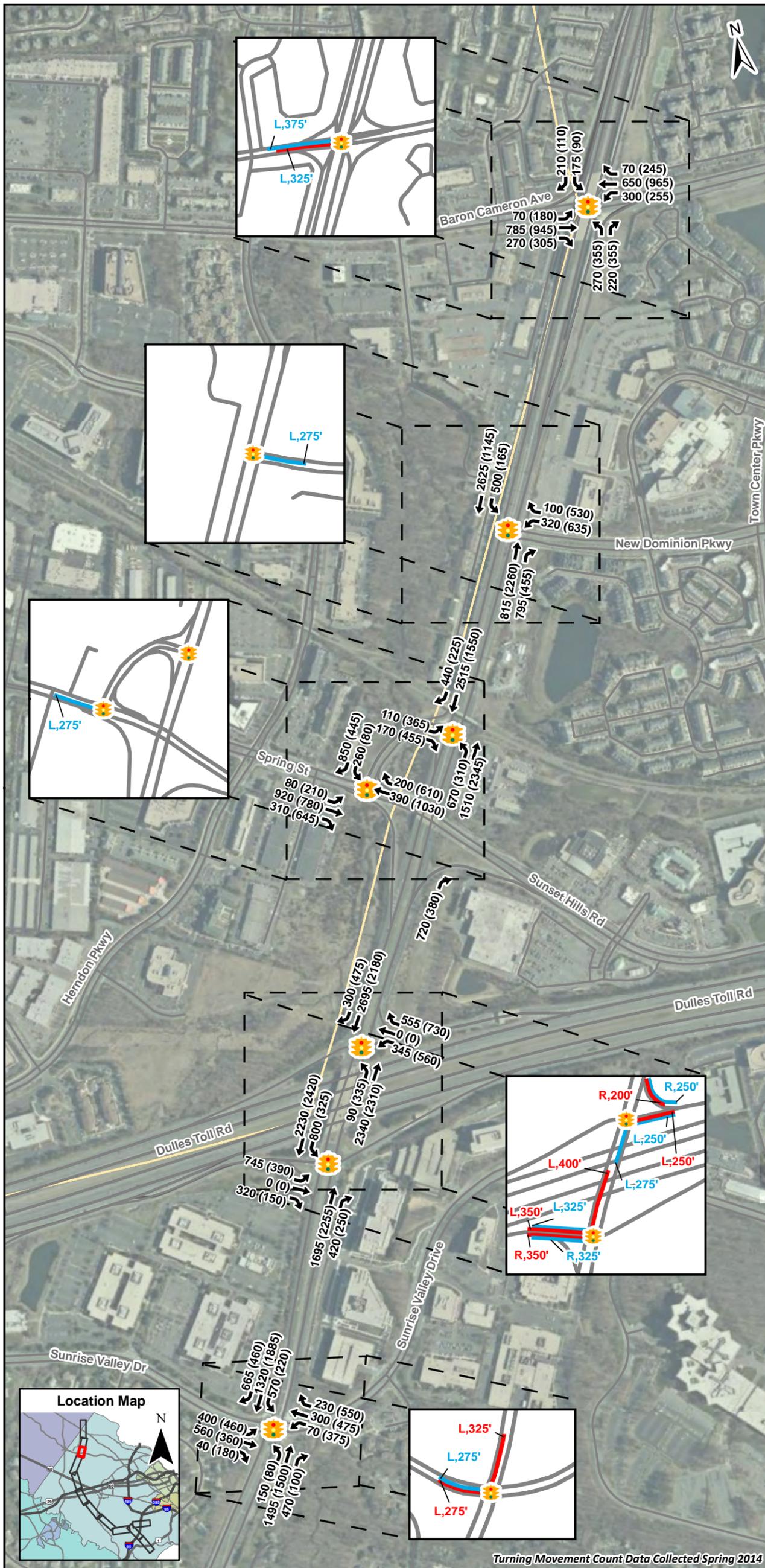
- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

0 500 1,000 2,000 Feet

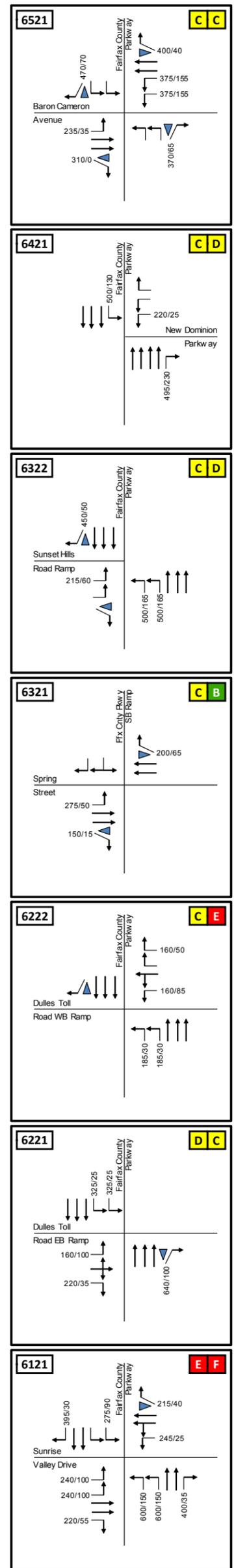
VDOT FAIRFAX COUNTY PARKWAY & FRANCONIA-SPRINGFIELD PARKWAY CORRIDOR STUDY KimleyHorn

**Figure 10K: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



1121 Intersection ID  
 AM PM Intersection LOS A or B  
 AM PM Intersection LOS C or D  
 AM PM Intersection LOS E or F

→ Travel Lane  
 Channelizing Island  
 ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

R/L,XX' AM Peak  
 R/L,XX' PM Peak

### Intersection Type

Signalized  
 Unsignalized

### Traffic

→ Turning Movement  
 xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

\*Limited to locations where the maximum queue exceeds the available storage

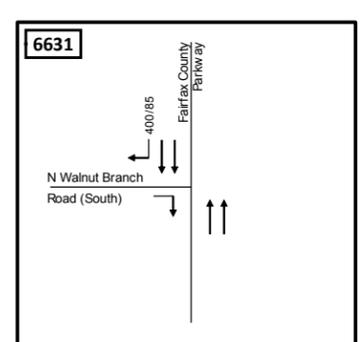
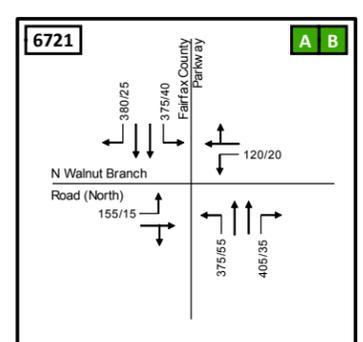
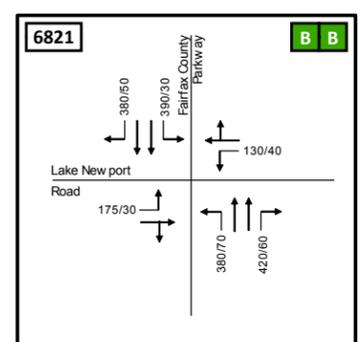
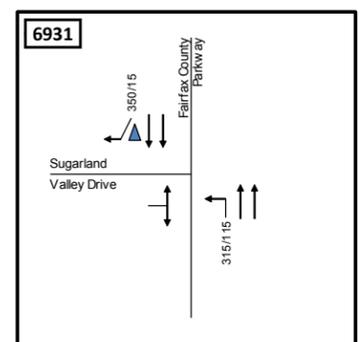
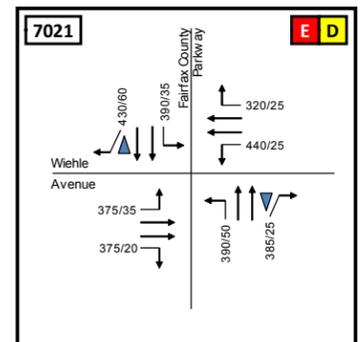


**Figure 10L: Study Area Intersections Overview**  
 Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths



## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L, XX' AM Peak
- R/L, XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage

### Intersection Type

- 🚦 Signalized
- 🛑 Unsignalized

### Traffic

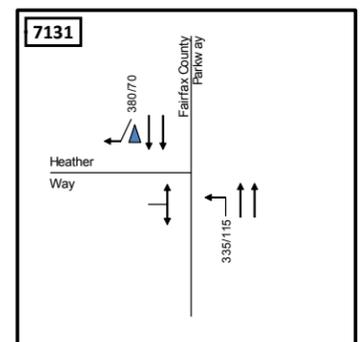
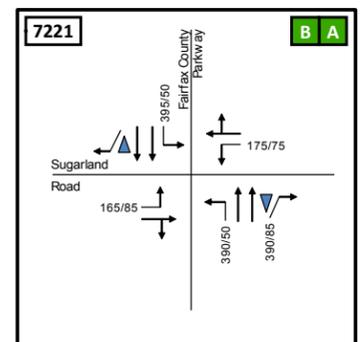
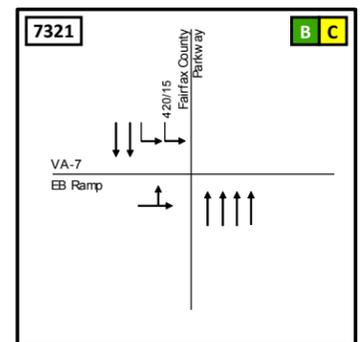
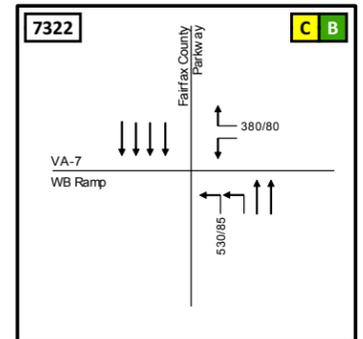
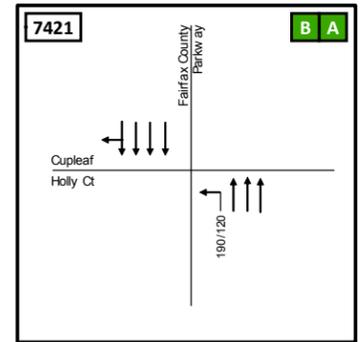
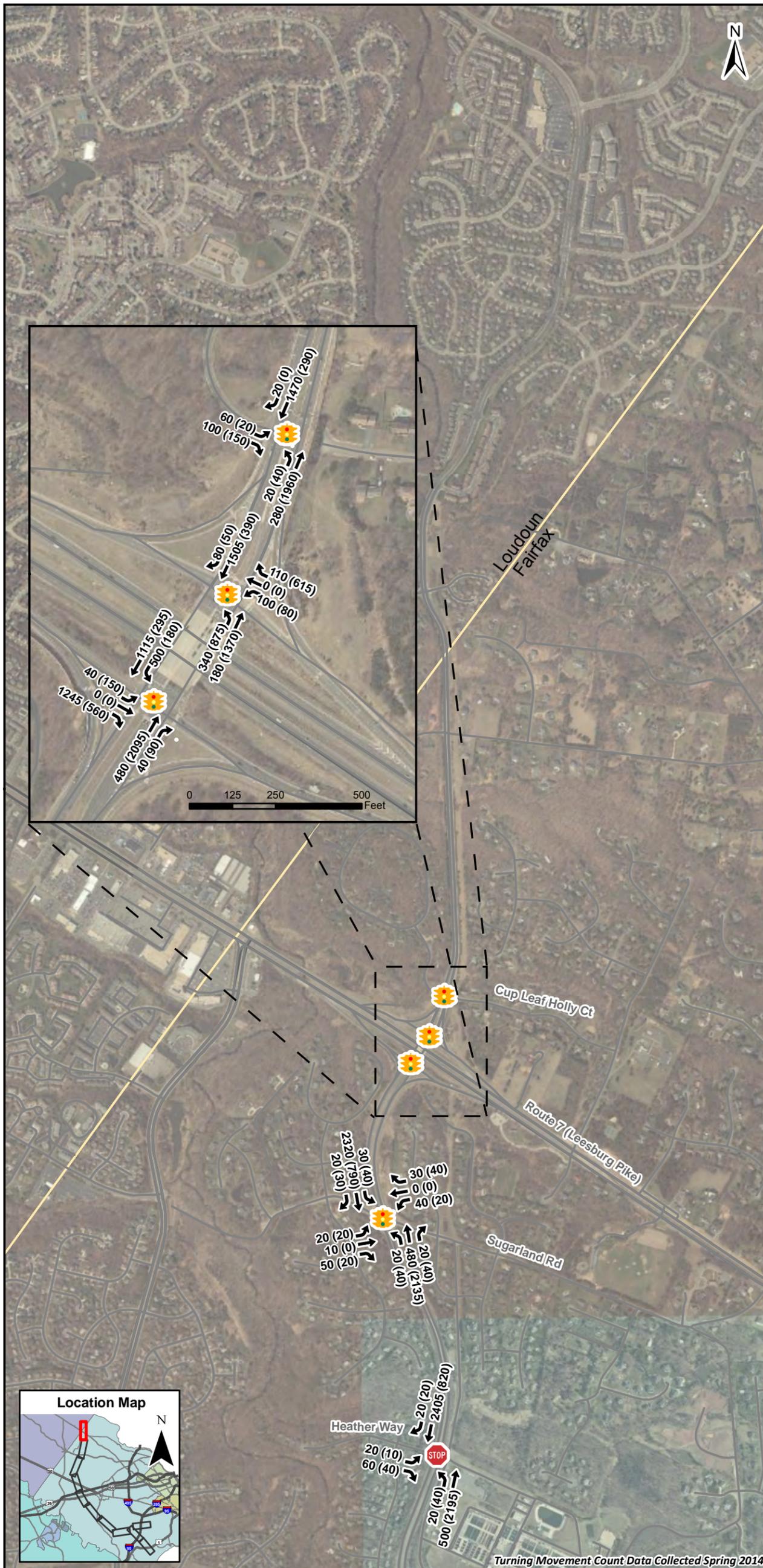
- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count



**Figure 10M: Study Area Intersections Overview**  
Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

# Peak Hour Turning Movement Counts and Maximum Observed Queue Lengths

## Intersection Geometry (Lanes, Storage, and Taper)



- 1121** Intersection ID
- AM PM** Intersection LOS A or B
- AM PM** Intersection LOS C or D
- AM PM** Intersection LOS E or F
- Travel Lane
- ▲ Channelizing Island
- ## / ## Storage/Taper (feet)

Signalized intersection LOS based on average VISSIM microsimulation delay. LOS is an approximation to the Highway Capacity Manual.

### Maximum Observed Queue Length\*

- R/L,XX' AM Peak
- R/L,XX' PM Peak

\*Limited to locations where the maximum queue exceeds the available storage



### Intersection Type

- ☀ Signalized
- STOP Unsignalized

### Traffic

- Turning Movement
- xx(xx) AM Peak Hour (PM Peak Hour) Turning Movement Count

## Figure 10N: Study Area Intersections Overview

Geometry, Peak Hour Volumes, Observed Queue Lengths, and Level of Service

## QUEUING DATA

As part of the data collection effort, queuing observations were performed twice per hour during the three hours of data collection in the morning and the three hours during the evening. Observations consisted of visually quantifying the number of vehicles present in each of the travel lanes along controlled approaches. Queuing information was not documented for free-flow movements (e.g. through lane on FCP at a stop controlled intersection). At a number of locations, observations were limited to the sight distance from the documentation site. If the back of the queue could not be visually observed, the last vehicle counted in the queue is notated with a “+” sign. This information is summarized in **Appendix B**.

**Figure 10A** through **Figure 10N** summarize limited queuing information. Where observed queue lengths exceeded the available storage for a turning movement, a queue length is noted in red or blue to represent the AM or PM peak period, respectively. Through movement queues are not illustrated in these figures.

## OPERATIONAL ANALYSES

Operational analyses were completed for the Fairfax County Parkway and Franconia-Springfield Parkway corridors using VISSIM microsimulation software. Another tool, VISUM, was used to develop origin-destination (O-D) routes through the study network and to generate a base network model for incorporation into VISSIM. This section summarizes the various modeling tools used to complete the analyses and the results of the existing conditions analysis. More comprehensive technical documents related to the VISUM modeling and VISSIM simulations are included in **Appendix F**.

### 4.3.1. VISUM Modeling

#### 4.1.1.1 Assumptions and Technical Approach

A number of assumptions were considered as part of the VISUM modeling effort to ensure consistency and efficiency in the development of the network and corresponding O-D routing. Some of the key assumptions made included the following:

- The year of the existing conditions scenario was defined as 2014
- The regional travel demand model used was Version 2.3 Build 57, directly released by MWCOG and TPB, with no further zone splits, centroid connector adjustments, or network refinements
- The analysis year used to produce existing conditions seed O-D matrices was 2015 per the regional travel demand model Version 2.3 Build 57

The approach to developing the VISUM model followed an intentional series of progressive tasks that resulted in an O-D trip table that could be used for vehicle routing within the VISSIM software. The approach, which is outlined below, also resulted in a network of basic geometric and operational features that could be refined within the VISSIM software. The primary steps executed in the VISUM model development and Origination-Destination Matrix Estimation (ODME) process included:

#### 4.1.1.2 Sub-Area Network

A sub-area network was developed in VISUM to include the study area corridors of Fairfax County Parkway and Franconia-Springfield Parkway, which included all study area intersections, interchanges, and ramps, along with adjacent arterials that provided access to the study corridors. The adjacent arterials were included in the sub-area network for routing trips into the network but were not considered in the operational analyses.

Initially, the MWCOG sub-area network of study intersections and the expanded network of adjacent arterials contained 239 traffic analysis zones (TAZs). The Fairfax County Parkway sub-area network was modified to match the Fairfax County subzone system which includes 260 zones, inclusive of the expanded network. To improve trip loading to the network, 26 new zones were added. This resulted in a trip table matrix of 283 x 283. Incorporating the Franconia-Springfield Parkway network and the corresponding expanded study area, the matrix was expanded (MWCOG sub-area matrix: 276 x 276 zones; FCP-FSP expanded area matrix: 325 x 325 zones). Following the disaggregation of zones to be consistent with the Fairfax County zone structure for the entire network and splitting zones to match the driveways and connectors for Fairfax County Parkway and Franconia-Springfield Parkway, the resultant matrix included 364 x 364 zones. The final seed demand matrix for the FCP-FSP corridor network contains 178 x 178 zones.

#### 4.1.1.3 Origin-Destination Trip Table

TFlowFuzzy was used to develop O-D trip tables for the AM and PM peak hours. TFlowFuzzy is a built-in ODME tool within VISUM that adjusts a given seed the O-D matrix in such a way that the result of the assignment closely matches target volumes at points within the network. In this analysis, TFlowFuzzy was conducted on the O-D tables for general purpose (including trucks) and HOV vehicles, but the volume targets were combined for all vehicles. A statistical performance evaluation was completed to validate the assignment of routes for the ODME. The resultant assignment was generally within 50 vehicles of the target and approximately 98 percent of turns were within 25 vehicles for both the AM and PM peak hours. The routing information derived from the trip tables was used in VISSIM simulation analysis for the seeding, peak period, shoulder intervals identified above.

#### 4.3.2. VISSIM Simulations

The existing conditions AM and PM VISSIM models were developed to evaluate the FCP and FSP mainline with limited access (freeway basic, merge, diverge, and weave sections), mainline intersections, and ramp intersections. Traffic volumes, travel times, speeds, and queue lengths were used as calibration measures for this study. The model assumptions, development, calibration process, and detailed calibration and operational results are documented in the VISSIM Calibration Memorandum, which is in **Appendix F**. This section of the report focuses on the VISSIM analysis results.

##### 4.1.2.1 Traffic Simulation Modeling Assumptions

The existing conditions VISSIM models were developed in VISSIM 7. O-D data for the FCP and FSP corridors was obtained from MWCOG regional model following the VISUM ODME process described above. The existing conditions VISSIM models were developed using the following data:

- Existing roadway geometry
- Existing traffic signal timings and phasing for all signalized intersections
- Balanced existing peak hour traffic volume data
- O-D data from MWCOG model and VISUM ODME
- Existing heavy vehicle percentages
- Posted mainline, ramp, and crossing street advisory speeds
- Mainline average speeds from INRIX
- Existing acceleration and deceleration lane lengths
- Travel times from runs performed during field review
- Field review observations of existing queue lengths and corridor operations
- Congestion (bottleneck) scan using INRIX speed data

#### 4.1.2.2 VISSIM Analysis Results Summary

The following MOEs were used to depict the operational characteristics of the study area network and identify bottleneck locations:

- Freeway mainline and ramps
  - Average density (vehicles per lane per mile)
  - Average space mean speed (miles per hour)
  - Average travel time (minutes)
  - Average and maximum queue length (feet)
- Arterial and ramp intersections (by movement and approach)
  - Average microsimulation delay (seconds per vehicle)
  - Average and maximum queue length (feet)

**Figure 10** illustrates the average microsimulation delay categorized in level of service (LOS) thresholds (see **Table 5**) from the VISSIM model for the signalized intersections. **Appendix F** includes a comprehensive summary of LOS for all locations, including mainline segments of the Parkways.

**Table 5: VISSIM Analysis Results (Signalized Intersections)**

| LOS Scale* | Average Delay (seconds/vehicle) |
|------------|---------------------------------|
| A          | ≤10 (Free Flow)                 |
| B          | >10 – 20 (Slight Delays)        |
| C          | >20 – 35 (Acceptable Delays)    |
| D          | >35 – 55 (Occasional Delays)    |
| E          | >55 – 80 (Significant Delays)   |
| F          | >80 (Excessive Delays)          |

\*LOS is an approximation to the Highway Capacity Manual (HCM) LOS

## 5 CRASH ANALYSIS

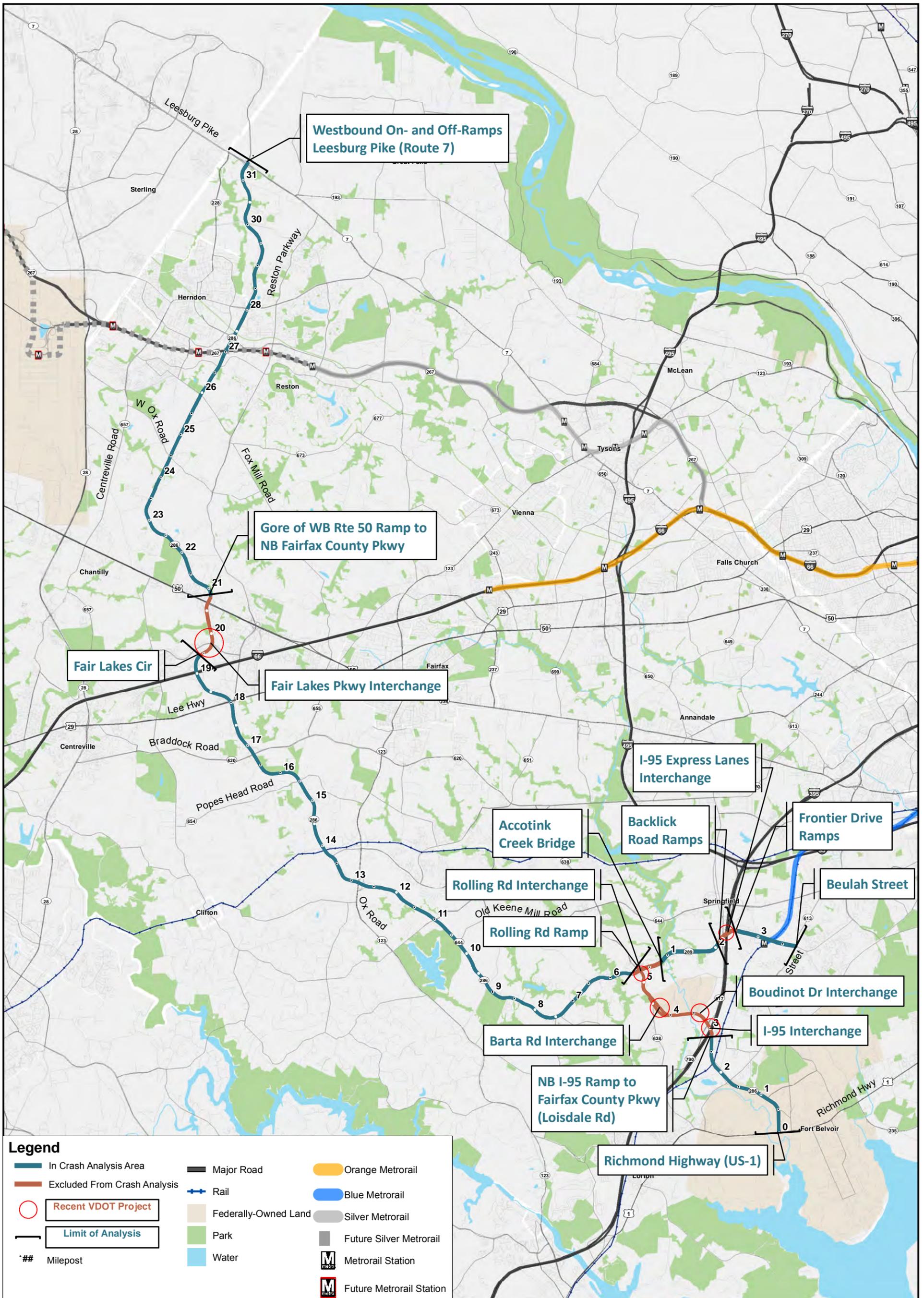
Crash data for Fairfax County Parkway and Franconia-Springfield Parkway mainline, on- and off-ramps, and intersections within the study corridor was used to evaluate safety and identify crash patterns. Crash data was obtained from VDOT for the latest available four years of crash data. Data for the Fairfax County Parkway corridor were evaluated for the period between January 1, 2010 and December 31, 2013. For the Franconia-Springfield Parkway corridor, the data set was expanded to include the period between January 1, 2010 and December 31, 2014, given the timing of the crash analysis of this corridor.

The crash analysis was conducted along Fairfax County Parkway from the northern limit of Leesburg Pike (Route 7) to the southern limit of Richmond Highway, and along Franconia-Springfield Parkway between the Rolling Road interchange and Beulah Street. A number of major construction activities occurred along the study corridor during the analysis time period that may have impacted crash patterns. For this reason, the following roadway segments were excluded from the crash analysis:

- Fair Lakes Parkway Interchange Construction — approximately 1.5 miles of Fairfax County Parkway excluded between Fair Lakes Circle and the Route 50 interchange

- Rolling Road/Barta Road/Boudinot Drive/I-95 interchange construction and/or improvements — approximately 2.5 miles of Fairfax County Parkway excluded between Loisdale Road and the Rolling Road ramp
- Rolling Road interchange improvements — approximately 0.5 miles of Franconia-Springfield Parkway excluded between the Rolling Road interchange and the Accotink Creek Bridge
- I-95 Express Lanes intersection improvements — approximately one mile of Franconia-Springfield Parkway excluded between the Backlick Road interchange ramps and the Frontier Drive interchange ramps

**Figure 11** illustrates the limits of the crash analysis study area for Fairfax County Parkway and Franconia-Springfield Parkway. Also summarized are the hot spot mainline crash locations, intersection hot spot locations, intersections of concern, and fatal crash locations. These are discussed in greater detail in the subsequent sections. Complete documentation of the crash analysis can be found in **Appendix G**.



**Figure 11: Limits of Crash Analysis**  
**Kimley»Horn**

## HOT SPOT MAINLINE CRASH LOCATIONS

Crash densities were evaluated along the mainline to identify hot spot crash locations, which considered crash activity within each half-mile segment of the corridor for each direction of travel. To be considered a hot spot, the crash density within a half-mile segment had to exceed the average crash density for the roadway plus two standard deviations. The directional critical crash densities for the distinct study corridors are summarized in **Table 6**.

**Table 6: Critical Crash Densities (per half mile)**

|                               | Northbound/<br>Westbound | Southbound/<br>Eastbound |
|-------------------------------|--------------------------|--------------------------|
| Fairfax County Parkway        | 48.78                    | 32.92                    |
| Franconia-Springfield Parkway | 28.61                    | 47.66                    |

A total of six hot spot crash locations were identified along Fairfax County Parkway, with an additional two along Franconia-Springfield Parkway. The vast majority of crashes that occurred within the hot spot locations were rear end collisions. Other common crash types included fixed object (off road), sideswipe (same direction), and angle collisions. A summary of the hot spot locations by corridor is provided below:

### Fairfax County Parkway

- Southbound #1 — 0.5 miles north of Richmond Highway to the intersection with Richmond Highway
- Southbound #2 and #3 — 1 mile between Spring Street and Sunrise Valley Drive
- Northbound #1 — 0.5 miles between Terminal Road and I-95
- Northbound #2 — 0.25 miles north and south of the Burke Centre Parkway intersection
- Northbound #3 — 0.5 miles between Sunrise Valley Drive and the Dulles Toll Road

### Franconia-Springfield Parkway

- Eastbound #1 — 0.5 miles west of Beulah Street to the intersection with Beulah Street
- Westbound #1 — 0.25 miles to the west and east of the Bonniemill Lane intersection

## INTERSECTION CRASH ANALYSIS

Intersection hot spots and locations of concern were identified in addition to the mainline hot spot locations. Similar to the mainline hot spots, the crash frequency was considered as a metric relative to the average crash rate, specifically injury crashes. For intersections located along Fairfax County Parkway, the average intersection injury crash rate was determined to be 0.16 injury crashes per million vehicles. The hot spot threshold was calculated as two standard deviations above that value, or 0.44 injury crashes per million vehicles. Using the same approach, the threshold for Franconia-Springfield Parkway was determined to be 0.86 crashes per million vehicles. This is an indication that the average crash rate is higher along this facility.

Considering these metrics, the following intersections were identified as hot spot crash locations:

**Fairfax County Parkway**

- Fairfax County Parkway at Richmond Highway (located within a mainline hot spot)
- Fairfax County Parkway at Terminal Road (located within a mainline hot spot)
- Pohick Road at the Eastbound Fairfax County Parkway ramp
- Northbound Fairfax County Parkway Ramp at Route 29 Westbound C-D Road
- Southbound Fairfax County Parkway Ramp at Route 29 Eastbound C-D Road

**Franconia-Springfield Parkway**

- Bonniemill Lane at Hooes Road

The classification as a hot spot intersection is a factor of volume and injury. High volume intersections would require a high number of crashes to occur in order to be classified as a hot spot location. While all crashes carry the potential for injury, the crash types that are more likely to result in an injury are head-on, angle, and fixed-object collisions. The most common crash type at these intersections was an angle collision, constituting more than 60 percent of all crashes documented at each location. This is well above the total for the corridor considering angle collisions, which account for only 29 percent of all intersection crashes along Fairfax County Parkway and only 20 percent along Franconia-Springfield Parkway.

In addition to intersection hot spot locations, intersections of concern were identified based on the number of crashes that occurred, particularly angle collisions. These locations did not qualify as hot spot locations given the volume of traffic entering the intersection. The intersections of concern that were evaluated as part of the study include the following:

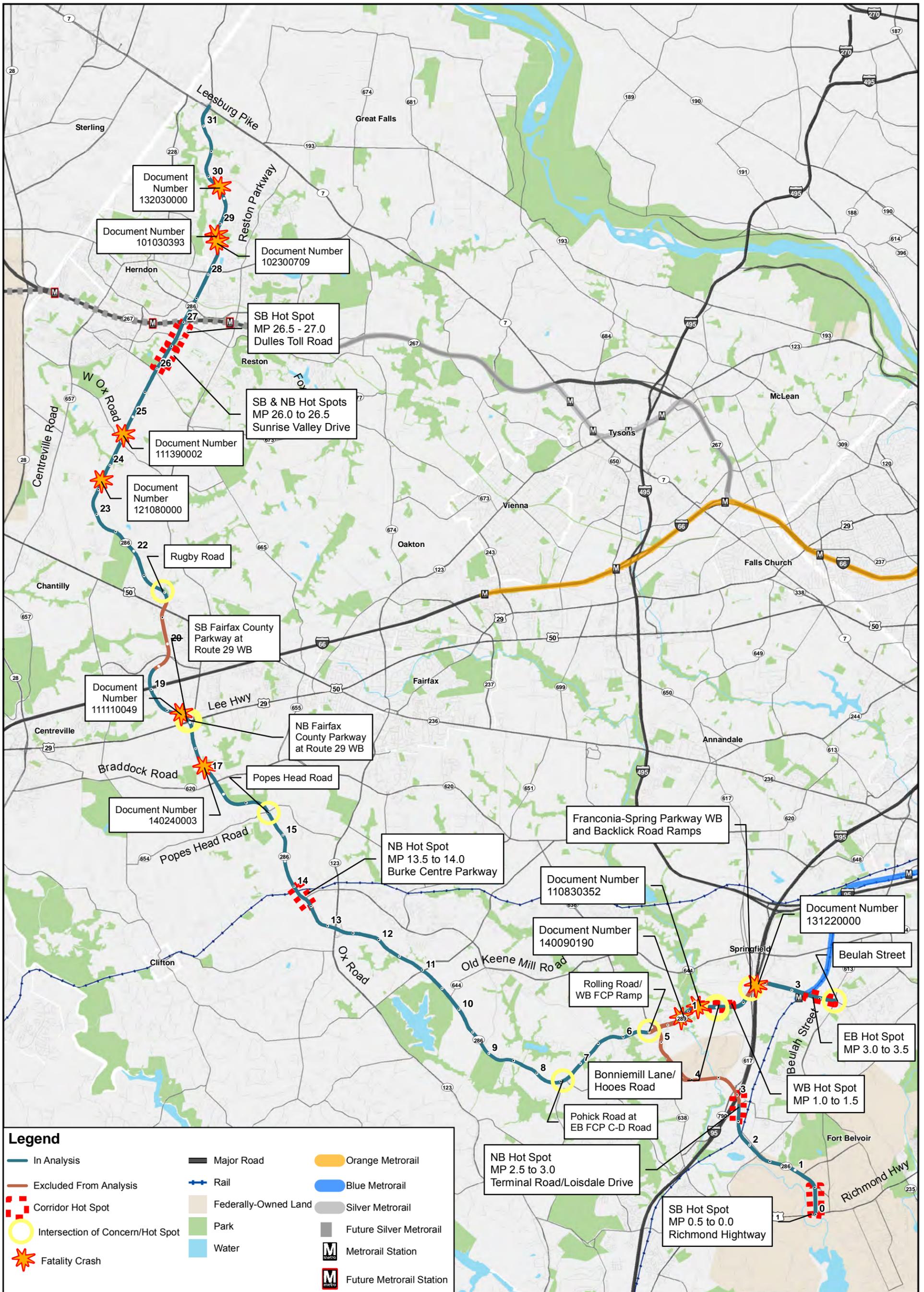
**Fairfax County Parkway**

- Fairfax County Parkway at Richmond Highway (located within a mainline hot spot)
- Fairfax County Parkway at Terminal Road (located within a mainline hot spot)
- Pohick Road at the Eastbound Fairfax County Parkway ramp
- Northbound Fairfax County Parkway Ramp at Route 29 Westbound C-D Road
- Southbound Fairfax County Parkway Ramp at Route 29 Eastbound C-D Road

**Franconia-Springfield Parkway**

- Bonniemill Lane at Hooes Road

**Figure 12** summarizes the mainline hot spot locations, intersection hot spots, intersections of concern, and fatality crash locations.



**Figure 12: Mainline Hot Spots, Intersection Hot Spots, Intersections of Concern, and Fatal Crashes**  
Kimley»Horn

## 6 IDENTIFICATION OF CORRIDOR ISSUES

One of the primary objectives of this corridor study is to identify operational and safety issues of the existing Fairfax County Parkway and Franconia-Springfield Parkway corridors. From the issues, the study could then identify recommendations for improvements. These recommended improvements are outlined in greater detail in Chapter 7 (Corridor Multimodal Short-Term Improvements). The process for identifying corridor issues was based upon a number of factors, including:

- Field observations of peak period operations
- Poor levels of service, significant delay, and/or queuing deficiencies determined from the field observations and the operational analyses
- Crash analysis of the corridor and study intersections
- Comments received at the project public meetings (see **Appendix A**)

The following sections summarize the various means used to identify corridor issues. Although not comprehensive within the document, a separate corridor improvements summary includes an overview of the issues by study intersection and specific mitigation measures to consider. This is included as an appendix to Chapter 7 (Corridor Multimodal Short-Term Improvements) as **Appendix I**.

### FIELD OBSERVATIONS SUMMARY

On October 28, 2014, a team of 10 individuals conducted a comprehensive review of corridor operations between 7:00 and 9:00 a.m. during the AM peak period and between 4:00 and 6:00 p.m. during the PM peak period. The corridor was divided into approximately equal segments of approximately three miles, with each individual responsible for traveling the length of their segment and performing periodic observations of each study area intersection and the corridor itself. Field observation sheets were completed to document the location and approximate timeframe of any notable issues, including operational or safety related concerns. These notes and individual feedback were used to generate a preliminary field observation summary map of Fairfax County Parkway, which is depicted in **Figure 13**. A similar effort was completed on October 8, 2015 for Franconia-Springfield Parkway during similar timeframes. AM and PM peak period observations were completed in a similar manner, with the key findings from the field review also documented in **Figure 13**.

In addition to completing peak period field observations, intersection inventories were completed for each of the study intersections and interchanges to document existing geometry, pedestrian accommodations, intersection control, and signal operations. Photographs were also collected for future reference in developing the traffic analysis models to confirm intersection configuration. Not only were intersection assets recorded, available pedestrian, bicycle, and transit facilities were noted along with any indications of potential operational or safety issues (e.g. crash debris, skid marks, damaged poles or guardrail).



*Exhibit 10: Northbound congestion during the morning commute traveling along Fairfax County Parkway between Burke Centre Parkway and Popes Head Road*

Using the data collected, a preliminary list of issues was developed. The vast majority of the issues identified were intersection specific, but a few common themes were identified along the corridor. The most commonly identified issues include the following:

- Recurring congestion and long queuing at several locations
- Existing curb ramps are non-compliant with Americans with Disabilities Act (ADA) guidelines
- No detectable warning surface is provided at the base of the ramp or edge of the shared-use path
- Inconsistent signage and markings are applied for channelized right-turn lanes with pedestrian crossing conflicts
- Inaccessible pushbuttons at signalized pedestrian crosswalks
- Poorly defined continuity in the trail network
- Lack of pedestrian accommodations at signed bus stop locations (i.e. pedestrian bus stop pad)



*Exhibit 11: Inaccessible pedestrian push button*

The bulk of the issues identified were from the intersection inventory, which allowed for targeted evaluation of each intersection. As noted in **Figure 13**, there are operational issues that extend beyond the local intersection. Queuing conditions (both stopped and rolling) were observed at several locations along the study corridor, with the most extensive queuing observed at the Popes Head Road intersection. In addition to queuing, merge and sight distance challenges were documented at a number of intersections and merge points. One recurring signal operations issue noted was queue spillback from turn lanes, which is a byproduct of significant vehicular demand at the intersection and insufficient capacity or available green time to serve all movements. Progression along Fairfax County Parkway was noted to be challenging through the Dulles Toll Road interchange; however, a review of the signal timings indicates that an intentional decision in cycle length may have been made in order to reduce queuing along the off-ramps from the Dulles Toll Road.

## **SAFETY ISSUES BASED ON CRASH DATA/ANALYSIS**

As outlined in the Crash Data section, a review of the corridor was completed to evaluate safety and identify crash patterns. The findings of the review helped guide the identification of issues and associated improvement recommended improvements. Specific improvements are outlined in Chapter 7 (Corridor Multimodal Short-Term Improvements). Given the information obtained from the crash analysis, a field safety review was completed for the Fairfax County Parkway corridor on April 16, 2015 to evaluate potential causes for the crash patterns identified. A separate field safety review was conducted for the Franconia-Springfield Parkway corridor on January 11, 2016. While the focus of the review was on the hot spot locations derived from the crash analysis, general observations were made while traveling the corridor during the review to identify any other potential safety concerns and associated mitigation techniques.

A number of common issues were identified during the field safety review, although many locations warranted different countermeasures. The most frequent safety issues identified during the review included the following:

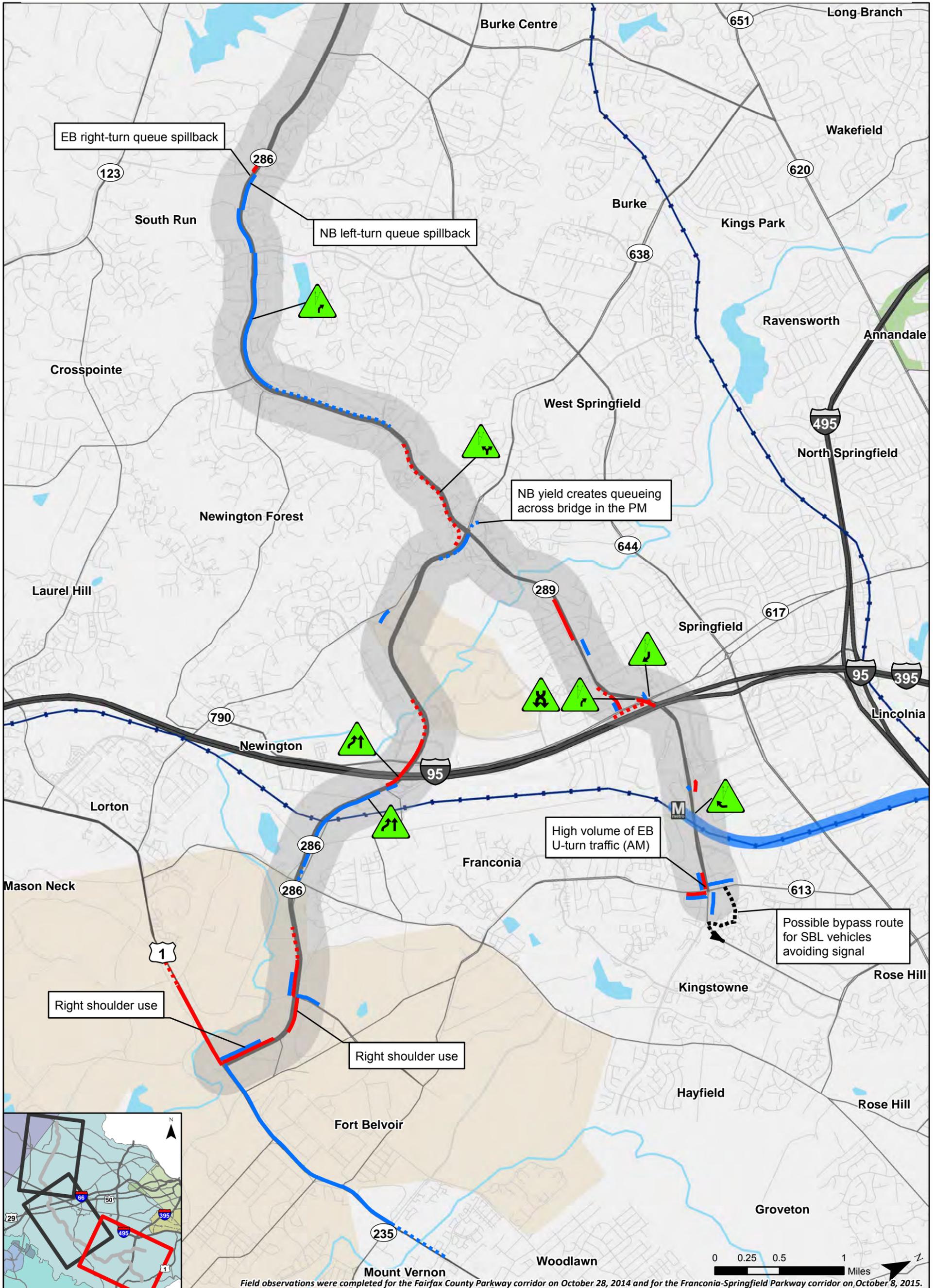
- Inadequate advance intersection signage (guidance and warning)
- Limited sight distance due to grade, roadside structure, or vegetation
- Difficult weaving segments caused by high volume interchanges
- Substandard roadway signage
- Large intersection footprints hindering signal visibility

Focused attention was geared toward evaluating the fatal crashes that were documented as part of the crash analysis. A total of seven fatal crashes occurred along Fairfax County Parkway and three occurred along Franconia-Springfield Parkway. Of these crashes, only three were not attributed to impaired driving, medical distress, or reckless behavior.



*Exhibit 12: Limited sight distance created by horizontal curvature of FCP and roadside vegetation*

A potential crash pattern was evaluated where two fatal crashes occurred in a similar location on Fairfax County Parkway. Both incidents involved a vehicle traveling in the northbound direction approaching the intersection of North Walnut Branch Road, resulting in their vehicles exiting the roadway through the horizontal curve along the approach. A field review of this location did not yield any specific mitigation measures given the wide median, comfortable driving experience at the posted speed limit, and adequate sight distance. It is worth noting that both drivers involved in the fatal crashes had been drinking according to the incident reports.



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

- Observed Queues**
- - - AM, Rolling
  - AM, Stopped
  - - - PM, Rolling
  - PM, Stopped

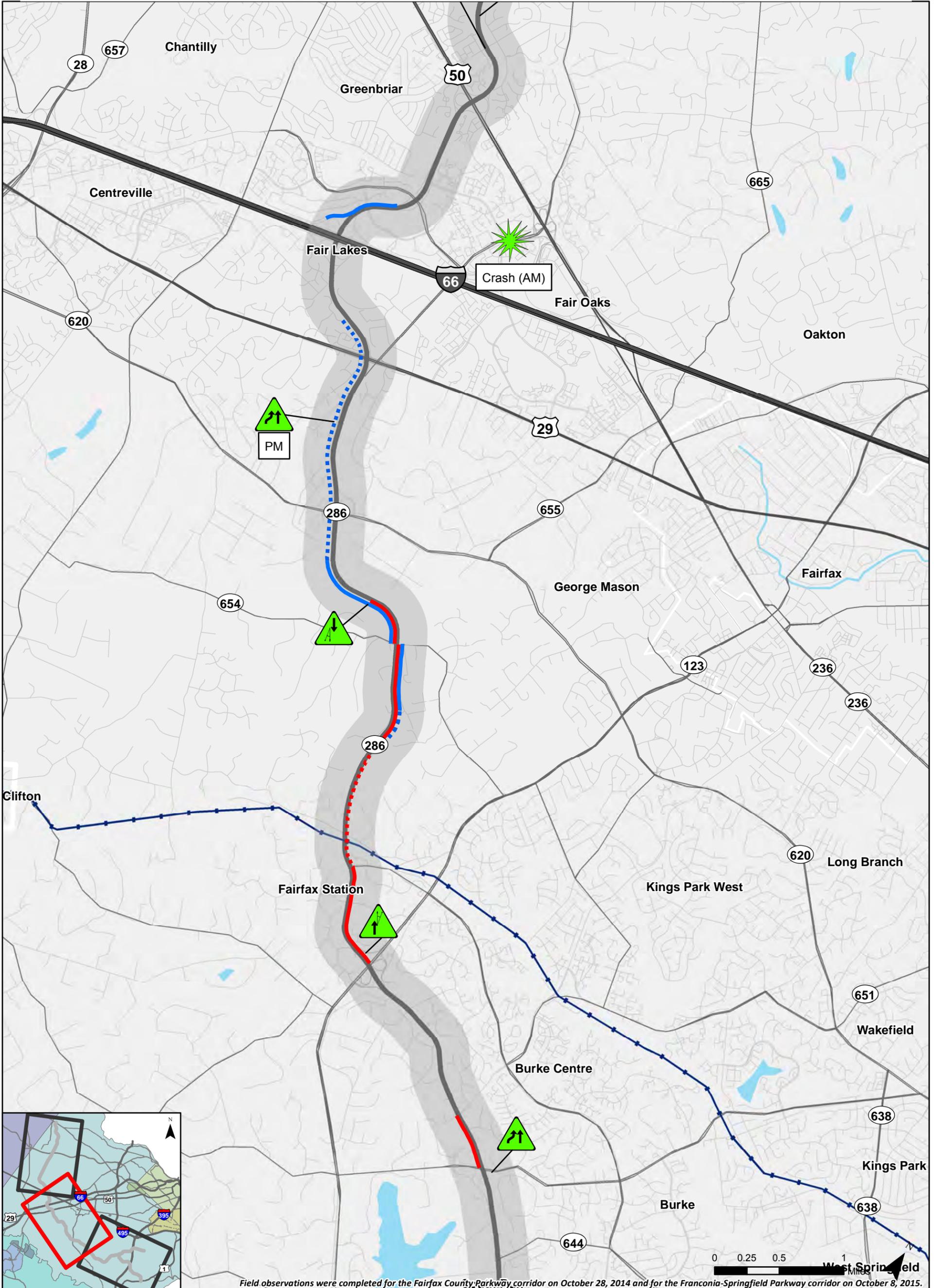
- Crash
- Merge Issue
- Sight Distance Issue
- Weaving Issue

- Major Road
- Rail
- Study Area
- Metrorail Station

- Blue Metrorail
- Silver Metrorail
- Future Silver Metrorail
- Future Metrorail Station

- Park
- Water
- Federally-Owned Land

**Figure 13A: Existing Corridor Issues**



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

- Observed Queues**
- - - AM, Rolling
  - AM, Stopped
  - - - PM, Rolling
  - PM, Stopped

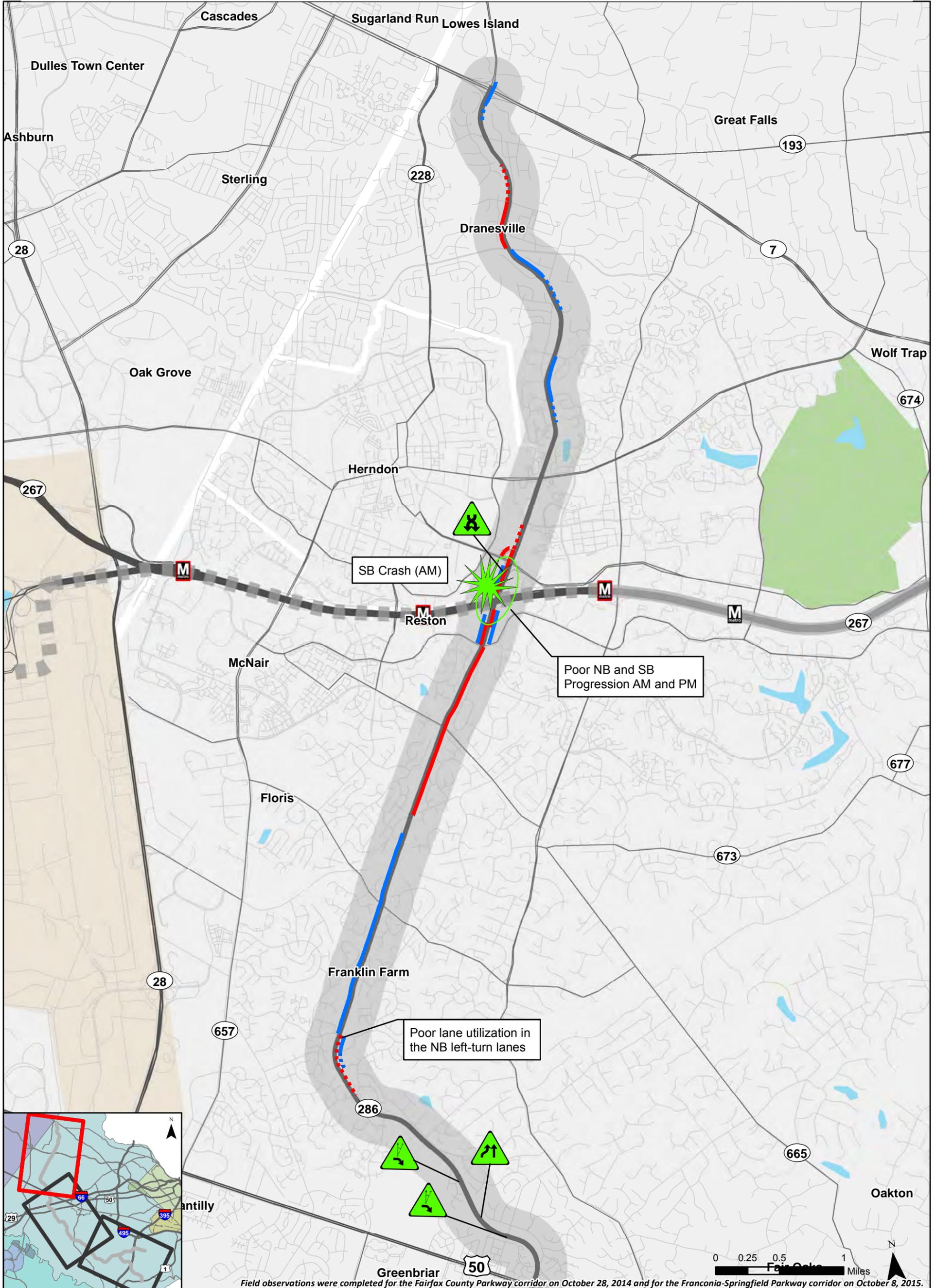
- Crash
- Merge Issue
- Sight Distance Issue
- Weaving Issue

- Major Road
- Rail
- Study Area
- Metrorail Station

- Blue Metrorail
- Silver Metrorail
- Future Silver Metrorail
- Future Metrorail Station

- Park
- Water
- Federally-Owned Land

**Figure 13B: Existing Corridor Issues**



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

- Observed Queues**
- - - AM, Rolling
  - AM, Stopped
  - - - PM, Rolling
  - PM, Stopped

- Crash
- Merge Issue
- Sight Distance Issue
- Weaving Issue

- Major Road
- Rail
- Study Area
- Metro rail Station

- Blue Metro rail
- Silver Metro rail
- Future Silver Metro rail
- Future Metro rail Station

- Park
- Water
- Federally-Owned Land

**Figure 13C: Existing Corridor Issues**

One of the crashes occurred in a portion of the Franconia-Springfield Parkway corridor that was excluded from the crash analysis due to recent construction activity at the interchange with I-95. The incident involved a driver crossing into the opposing direction of travel on a red signal. The field safety review recommended additional warning signs on the approach to the intersection, but did not identify any specific improvements that could prevent such a crash from occurring in the future.

A comprehensive summary of safety issues and associated recommended improvements is provided in Chapter 7 (Corridor Multimodal Short-Term Improvements).

## OPERATIONAL ISSUES BASED ON TRAFFIC OPERATIONS ANALYSIS

The traffic simulation analysis in VISSIM helped identify and confirm the following bottleneck locations that have significant reduction in average speeds and extended queues on mainline FCP and FSP. Some of the crossing streets also experience significant delays and queuing impact. The primary operational issues identified consisted of the following:

### AM Peak:

- Northbound congestion at the Dulles Toll Road interchange and intersection with Sunrise Valley Drive; the ripple effect on northbound traffic platoons extends as far south as the Fox Mill Road intersection
- There are significant slow-moving platoons and stop-and-go conditions along northbound FCP between Roberts Way and Popes Head Road, although none of the queues have a direct impact on intermediate intersections
- Southbound congestion at Richmond Highway.
- The following locations demonstrate significant queuing during the AM peak:
  - Southbound traffic flow is disrupted at Wiehle Avenue due to signal operations, causing extended southbound queues
  - Southbound left-turn queues at the Dulles Toll Road eastbound ramp intersection exceed the available storage and affect southbound through traffic on FCP in the vicinity of the Dulles Toll Road interchange
  - Southbound and eastbound left-turn queues at the Sunrise Valley Drive intersection exceed the available storage
  - Eastbound left- and westbound right-turn queues at the Franklin Farm Road intersection exceed the available storage
  - Significant queue spillback on westbound Popes Head Road from FCP

### PM Peak:

- Southbound congestion at the Dulles Toll Road interchange and intersection with Sunrise Valley Drive; queues extend to just south of New Dominion Parkway
- Southbound congestion between the Route 29 interchange and Popes Head Road; southbound FCP mainline queues extend from Popes Head Road through the Braddock Road and Route 29 interchanges
- Southbound congestion at Richmond Highway
- Northbound congestion between the Sydenstricker Road/Shady Palm Drive/Gambrill Road/Olde Lantern Way interchange and Huntsman Boulevard (slowing moving platoons and stop-and-go conditions)
- Northbound congestion at the I-95 interchange and Loisdale Road intersection

- The following locations demonstrate significant queuing during the PM peak:
  - Significant side street queues on westbound Sunrise Valley Drive, eastbound West Ox Road, eastbound Franklin Farm Road, and westbound Rugby Road
  - Queue spillback from the I-66 westbound on-ramp onto southbound and northbound FCP
  - Northbound left-turn queue spillover at Lee Chapel Road

The following locations had congestion in both directions during both peak periods:

- FCP between the Dulles Toll Road and Sunrise Valley Drive
- The Popes Head Road intersection
- The Richmond Highway intersection

## CORRIDOR ISSUES IDENTIFIED BY THE PUBLIC

The public involvement process executed as part of this study afforded the users of the Parkways an opportunity to learn about the project, review the outcome of planning efforts, and provide insight on corridor issues. A handful of overarching corridor issues were identified during the public meetings. The primary issues identified consisted of the following:

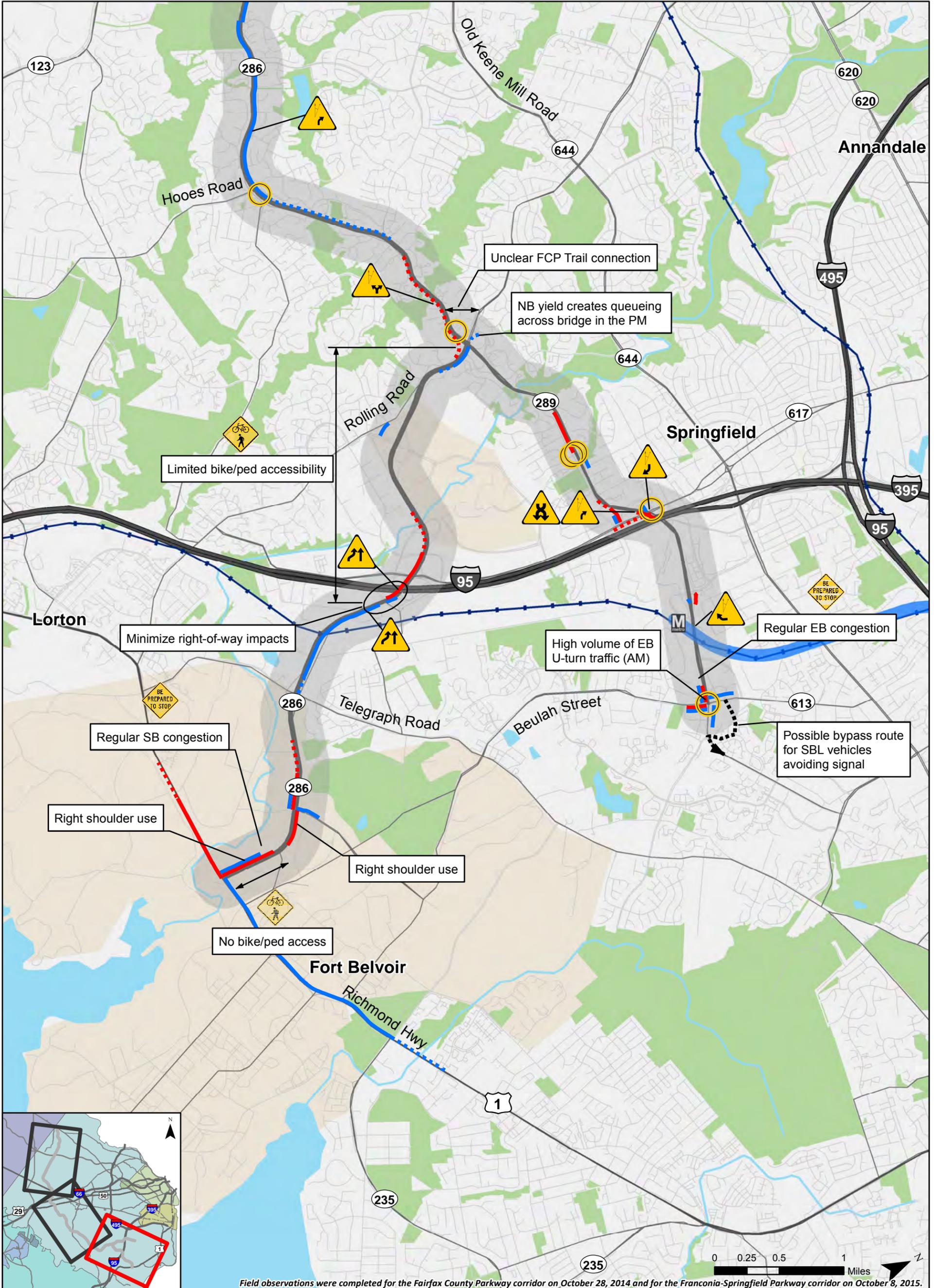
- Congestion at northern intersections along FCP (Sunrise Valley Drive to Spring Street)
- Difficult crossings along the FCP Trail (Route 50, Sunrise Valley Drive, Dulles Toll Road, Spring Street)
- Gaps in the existing FCP Trail (I-66, Route 123, Rolling Road to I-95) and FCP Trail wayfinding
- Overhead lighting (intersections, FCP Trail, overhead guide signs)
- Traffic signal right-turn on red conflicts with FCP Trail users
- Lack of regular maintenance of the FCP Trail

Location specific issues discussed at length during the public meetings that have the potential for mitigation as part of the short-term improvement recommendations include the following:

- Poor sight distance at FCP and Heather Way for left-turning vehicles
- Left-turn queue spillback along northbound FCP at Wiehle Avenue during the afternoon
- Challenging pedestrian/bicycle access at FCP and the Dulles Toll Road intersections due to heavy volume of turning vehicles
- Challenging pedestrian access at FCP and Sunrise Valley Drive due to channelized free-flow right-turn, compounded by significant congestion due to insufficient number of through lanes
- Intersection geometry at FCP and Franklin Farm Road results in lengthy queues and congestion, particularly for the eastbound right-turn and mainline left-turn movements
- Dangerous turning movements at FCP and Popes Head Road
- Intersection geometry at FSP and Beulah Street results in lengthy queues and congestion along all approaches
- Lack of FCP Trail access from the residential community (100+ homes) located at Old Plains Road
- Significant delay for side street movements at the intersection of FCP with Rugby Road
- Bottleneck at Huntsman Boulevard during peak periods

## SUMMARY OF TRAFFIC, PEDESTRIAN, BIKE, AND SAFETY ISSUES

Consolidating the information gathered from the field observations, inventories, safety reviews, **Figure 14** summarizes the key issues that were identified within the study area. The graphic illustrates the commonly recurring issues that were identified along the study corridor and is not intended to be comprehensive.



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

**Observed Queues**

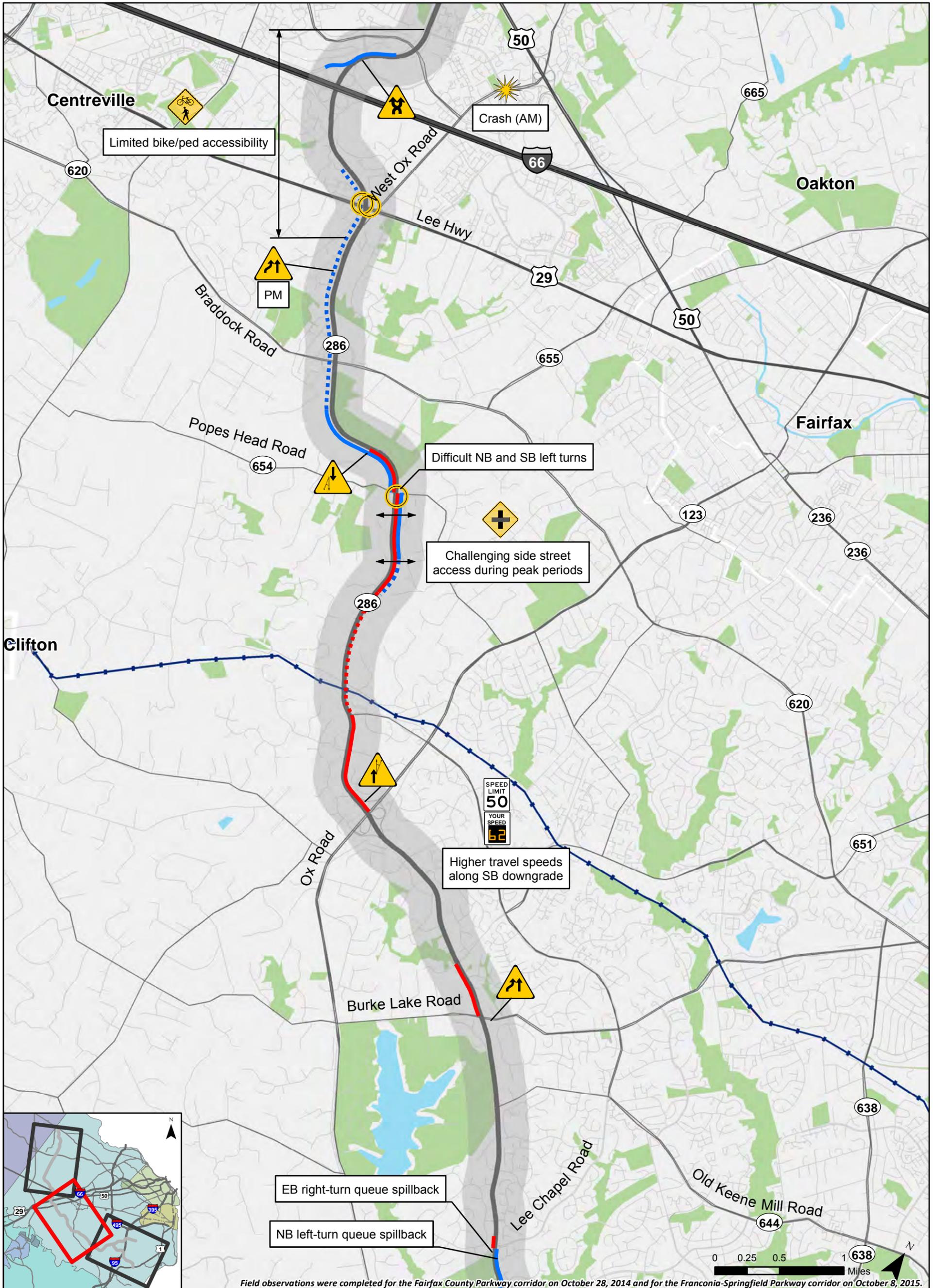
- - - AM, Rolling
- AM, Stopped
- - - PM, Rolling
- PM, Stopped

- Intersection of Concern
- Merge Issue
- Sight Distance Issue
- Weaving Issue

- Major Road
- Rail
- Study Area
- Metrorail Station

- Blue Metrorail
- Silver Metrorail
- Future Silver Metrorail
- Future Metrorail Station

**Figure 14A: Key Corridor Issues**



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

**Observed Queues**

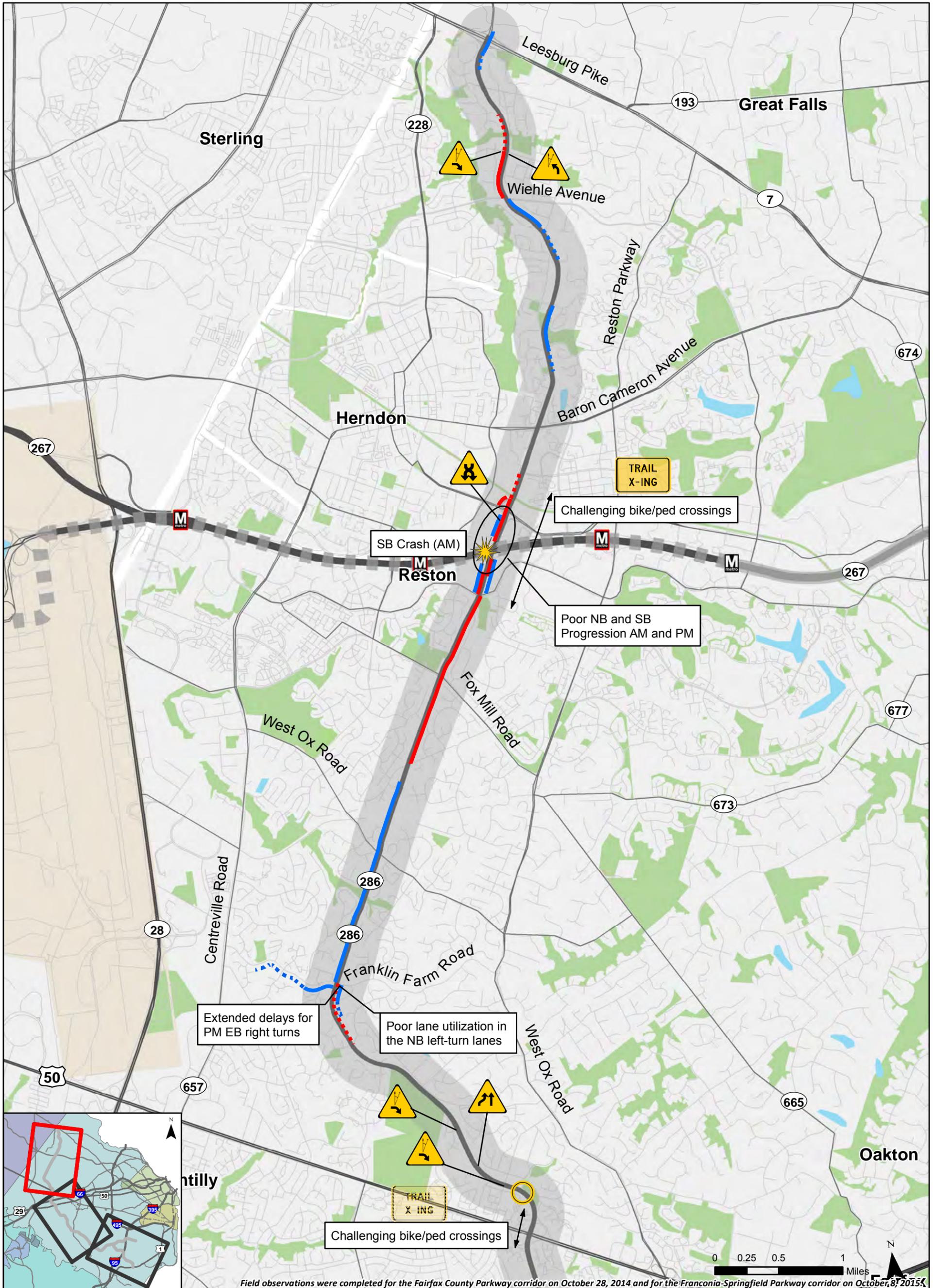
- ⋯ AM, Rolling
- AM, Stopped
- ⋯ PM, Rolling
- PM, Stopped

- Intersection of Concern
- ↗ Merge Issue
- ⚠ Sight Distance Issue
- ⚠ Weaving Issue

- Major Road
- Rail
- Study Area
- M Metrorail Station

- Blue Metrorail
- Silver Metrorail
- Future Silver Metrorail
- M Future Metrorail Station

Figure 14B: Key Corridor Issues



Field observations were completed for the Fairfax County Parkway corridor on October 28, 2014 and for the Franconia-Springfield Parkway corridor on October 8, 2015.

**Legend**

**Observed Queues**

- - - AM, Rolling
- AM, Stopped
- - - PM, Rolling
- PM, Stopped

- Intersection of Concern
- Merge Issue
- Sight Distance Issue
- Weaving Issue

- Major Road
- Rail
- Study Area
- Metrorail Station

- Blue Metrorail
- Silver Metrorail
- Future Silver Metrorail
- Future Metrorail Station

**Figure 14C: Key Corridor Issues**

## 7 CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS

As mentioned in Chapter 6, corridor and local intersection issues were identified through a variety of data sources including field observations, crash analyses, operational analyses, and input received during the public engagement process. The short-term recommended improvements were developed based on the 350+ transportation issues identified through these sources. Examples of these improvements developed from the various data sources include:

- **Field observations:** improved pedestrian signal accessibility, replacement of sidewalk ramps with ADA accessible ramps, pavement marking and signs updates, and extending turn lanes to mitigate queue spillback from turning lanes
- **Crash analyses:** changes to left-turn phasing to reduce the number of angle crashes and advance signage to alert drivers of a downstream traffic signal in an effort to reduce rear end collisions.
- **Operational analyses:** additional turn lanes, provision of right-turn overlaps for heavy right-turn movements, and alternative intersection geometry (e.g. median u-turn) to increase intersection capacity.
- **Public input:** modified geometry of right-turn lanes to increase the safety of trail crossings and relocated crosswalks to enhance visibility of bicyclists and pedestrians.

One of the objectives for the identification and evaluation of potential multimodal improvements is to provide consistency in application along the Parkways. Another objective is compliance with guidelines and standards established by VDOT, Fairfax County, and the Federal Highway Administration as well as the Americans with Disability Act. The following sections summarize the corridor-wide recommended improvements, specific trail crossing improvements, operational improvements, along with the categorization of improvements.

### CORRIDOR-WIDE RECOMMENDED IMPROVEMENTS

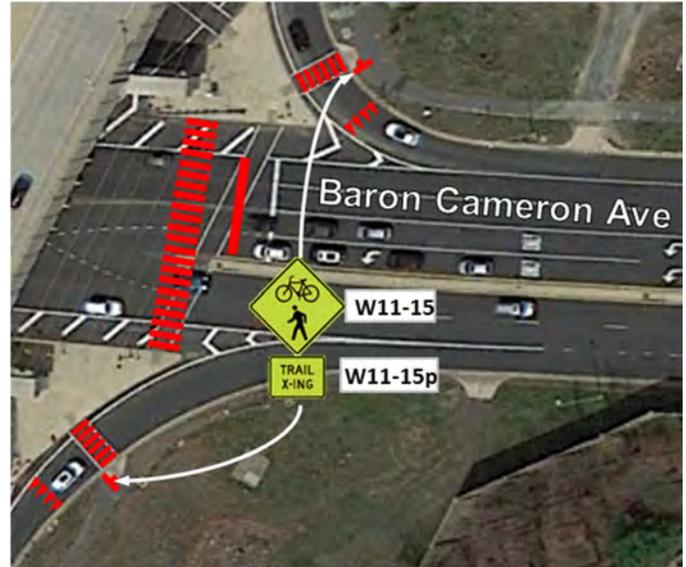
One of the initial outcomes of the completion of field observations along the Parkways was the identification of issues affecting many locations within the study area with similar corresponding improvements. By identifying corridor-wide issues, consistent short-term improvements were developed that were widely applicable to improve numerous local intersections. Summarizing the corridor-wide issues also served as a means to track the development of improvements corresponding to the issue. This was the case for areas of recurring congestion observed in the field. The summary of issues reinforced the identification of appropriate short-term improvements to address congestion issues. Areas of recurring congestion are illustrated in **Figure 14**.

Some of the recurring recommended improvements made along the Parkways to provide consistent applications at Fairfax County Parkway Trail crossings included:

- Installation of high-visibility crosswalk markings perpendicular to the direction of vehicular travel.
- Installation of combined bicycle and pedestrian warning signs.
- Provision of yield pavement markings in advance of crosswalk markings.
- Adjustment of the location of crosswalks to be closer to the adjacent travel lanes to improve visibility of trail users to oncoming vehicles.
- Replacement of existing crosswalks that are too narrow (i.e. less than 10 feet) or do not follow a singular directional path across the intersection.

- Construction of sidewalk to provide access to existing bus stops as well as bus stop pads where missing.

An example of typical trail crossing treatment recommended improvements is illustrated in Exhibit 13. These recommended improvements were often made at locations with existing crosswalk markings and signage. Feedback received from the bicycle community during the public meetings was that the realignment of crosswalks was not preferred for bicyclists. However, VDOT policy reinforces the need for this shift in orientation to provide the greatest visibility of pedestrians and bicyclists to oncoming vehicles (and vice versa) and to shorten the crossing distance.

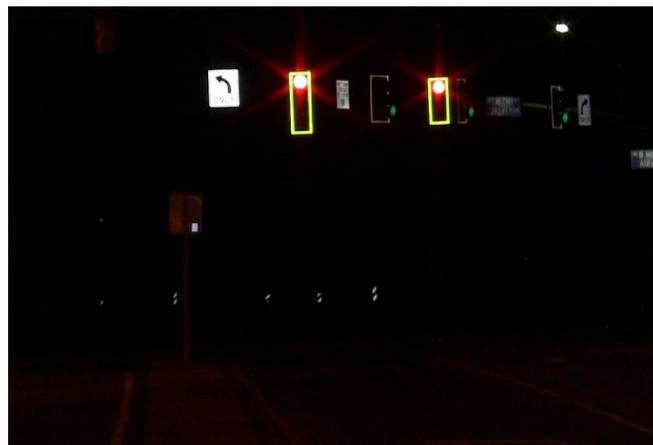


*Exhibit 13: Typical pavement marking and sign treatment improvements for trail crossings of channelized right-turn movements*

With respect to vehicular travel, several recurring issues were identified as part of the initial field observations as well as the field safety review. One of them identifies the lack of consistent notification of downstream intersections for motorists with “next signal” signs located in the median and on the shoulder. In addition, sight distance hindered the ability of drivers to anticipate a potential stopped condition in a few locations. Recommended improvements to provide consistency in the advance notification of signalized intersections include:

- Installation of “Next Signal” signs in both the median and the right shoulder.
- Installation of the graphical “Signal Ahead” sign where the roadway character transitions from free-flow to signal controlled conditions.
- Installation of flashing yellow beacons where visibility is limited or the roadway character transitions from free-flow to signal controlled conditions.

During the course of the study, VDOT began installing retroreflective (also known as high visibility) backplates at signalized intersections along the Parkways. This was one of the recommended improvements identified to address safety issues demonstrated as part of the crash analysis. This recommended improvement is retained in **Appendix I** since the deployment of this enhancement was still ongoing at the close of this study. It should be noted that more intersections were retrofitted with these safety devices than were identified as part of the recommended improvements.



*Exhibit 14: Example of Retroreflective (High Visibility) Traffic Signal Backplates at night*

Other corridor-wide improvements pertain to lighting and technology infrastructure. The use of street lights varies along the corridor, with some intersections fully illuminated with fixtures on all corners while others have little to no lighting infrastructure. In lieu of specific improvements, it is recommended that a corridor-wide street light study be conducted to identify locations that would benefit from new or additional lighting. Intelligent transportation system (ITS) and communication infrastructure is also deployed piecemeal along the corridor. VDOT has already prepared an ITS proposal for the Fairfax County Parkway, which identifies placement of closed circuit television (CCTV) camera and dynamic message sign (DMS) along the corridor. This includes existing, programmed, and unfunded equipment. In addition, expansion of the existing fiber optic communications network is outlined in the proposal. Given the independent assessment of ITS needs already completed by VDOT, this study did not recommend any additional ITS infrastructure improvements.



*Exhibit 15: DMS sign over the southbound lanes of Fairfax County Parkway at the Fair Lakes Parkway and Monument Drive interchange*

## TARGETED TRAIL CROSSING IMPROVEMENTS

During the public meetings, the issue of trail crossings along the Parkways at locations with high traffic volume and speeds were identified by numerous attendees. The primary concern was the safety of trail users at uncontrolled crossing locations with limited visibility. Below are the specific locations and conceptual graphics illustrating the short-term recommended improvement, which are included in **Appendix I**.

### 7.1.1 FCP Northbound to Sunset Hills Road Ramp

The trail crossing is located along the exit ramp from FCP. Visibility of trail users is limited by foliage along the shoulder. The recommended improvement includes the relocation of the crossing closer to the ramp gore and the installation of warning beacons that can be actuated by trail users to notify drivers of the presence of pedestrians and bicyclists.



*Exhibit 16: Recommended Improvements at FCP Northbound to Sunset Hill Road Ramp*

### 7.1.2 FCP Northbound to Route 267 (Dulles Toll Road) Eastbound Ramp

Similar to the Sunset Hills Road location, this trail crossing is located along the on-ramp to Route 267 (Dulles Toll Road) approximately 150 feet from the main travel lanes of FCP. The absence of signal control for the right-turn movement from FCP results in vehicles approaching the crosswalk at high rates of speed, limiting their ability to stop safely for trail users. Also, the location of the trail crossing is downstream from the intersection and is not where drivers typically expect to see a crosswalk. The recommended improvement reconfigures the right-turn movement to be perpendicular to the on-ramp to Route 267. The movement would be controlled by the signal and the approach angle would slow the speed of turning vehicles, increasing perception-reaction time on the approach to the crosswalk. The crosswalk would be relocated adjacent to the traffic signal and would include pedestrian signals.

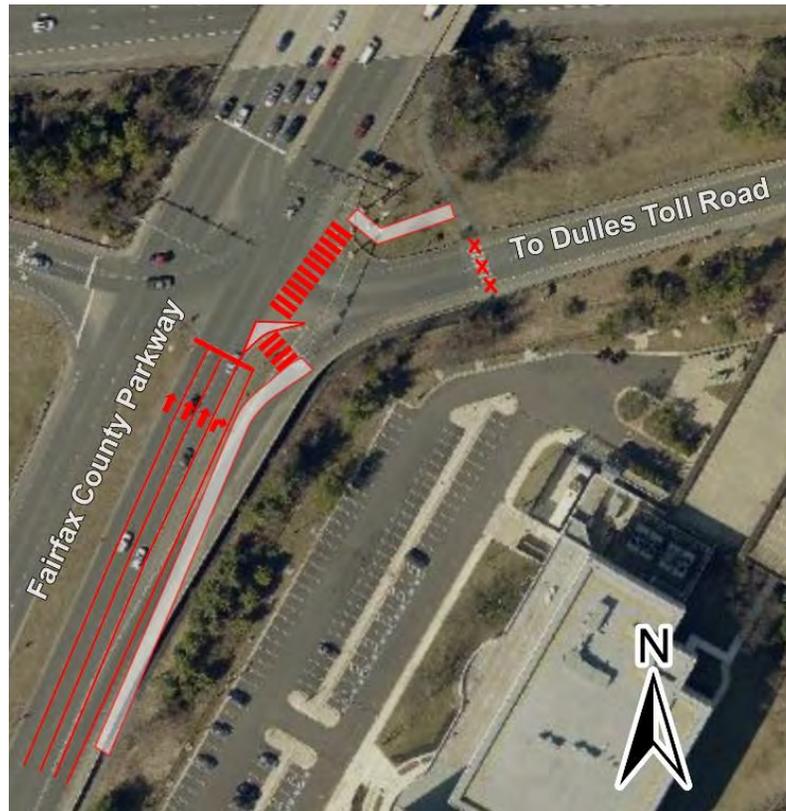


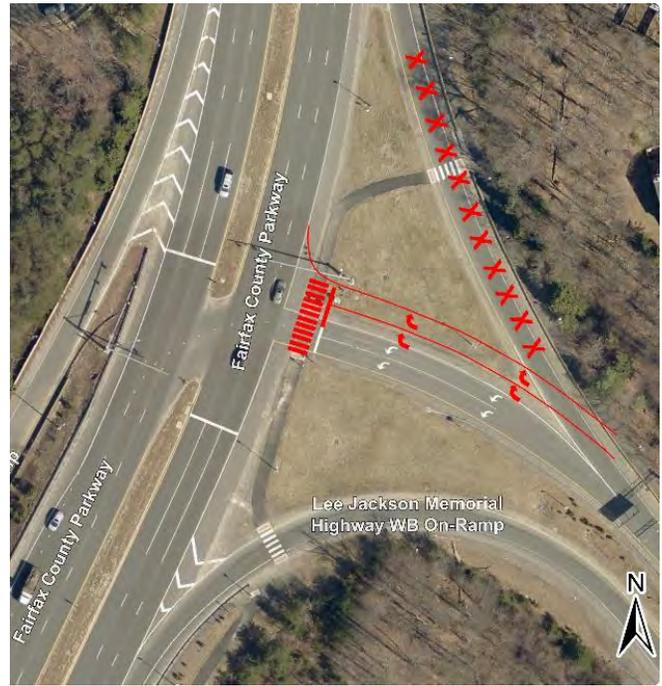
Exhibit 17: Recommended Improvements at FCP Northbound to Route 267 (Dulles Toll Road) Eastbound Ramp

### 7.1.3 FCP Northbound at the Route 50 Ramps

At Route 50, there are four ramp crossings along the northbound FCP lanes. Currently, only one of these ramps is controlled by a traffic signal – the remaining three operate as free-flow movements for vehicles. The design of the ramps allows vehicles to travel at high speeds, and the presence of roadside objects (e.g. barrier walls, foliage) limits the visibility of trail users in the crosswalk ahead. Two traffic signals operate along FCP at the interchange, controlling the left-turn movements from Route 50 to FCP. The recommended improvements would take advantage of the existing traffic signals by controlling the northbound FCP to eastbound Route 50 on-ramp (Exhibit 18) and the westbound Route 50 to northbound FCP on-ramp (Exhibit 19). In doing so, the crosswalks would be controlled with pedestrian signals that would provide exclusive ROW for both pedestrians and bicycles. The on-ramp to Route 50 westbound from northbound FCP would remain uncontrolled; however, signal operations would create gaps in traffic flow to allow for safe crossing of the ramp.



*Exhibit 18: Recommended Improvements at FCP Northbound to Route 50 Eastbound Ramp*



*Exhibit 19: Recommended Improvements at the Route 50 Westbound Ramp to FCP*

## SCREENING OF GEOMETRIC AND OPERATIONAL IMPROVEMENTS

There are numerous locations along the Parkways that experience significant congestion and vehicular delay during peak periods. In some instances, operational deficiencies were limited to a few turning movements at the intersection, while other locations experienced delays among nearly every turning movement. Based on the traffic data, field observations, and feedback provided from the public, a review of the Parkways was completed to identify intersections with congestion and operational deficiencies and the space for geometric short-term improvements to address congestion issues.

Improvements considered included additional turn or through lanes, modified lane assignments, changes to signal operations, and intersection reconfigurations. Turn lane extensions were not analyzed because the analysis tool (Synchro) used to screen the geometric and operational improvements does not report operational benefits of additional storage based on the Highway Capacity Manual (HCM) calculations. In addition, locations previously evaluated as part of another study or project were not included in the screening process. Below is a list of the intersections identified as having opportunity for short-term geometric and operational improvements:

- |                              |                                |
|------------------------------|--------------------------------|
| 1. FCP at Huntsman Boulevard | 7. FCP at Fox Mill Road        |
| 2. FCP at Burke Lake Road    | 8. FCP at Sunrise Valley Drive |
| 3. FCP at Rugby Road         | 9. FCP at Wiehle Avenue        |
| 4. FCP at Old Plains Road    | 10. FSP at Bonniemill Lane     |
| 5. FCP at Franklin Farm Road | 11. FSP at Beulah Street       |
| 6. FCP at West Ox Road       |                                |

Two intersections were excluded from the list above because an ongoing project is underway at the time this study was being completed. This ongoing project will widen Fairfax County Parkway from four lanes to six lanes and add a new grade separated interchange at the intersection of Popes Head Road. The improvements are more long-term in nature; therefore, the short-term improvements identified in this study were not evaluated for the Popes Head Road and Burke Centre Parkway intersections. Potential improvements are still included in the interactive PDF tool in **Appendix I** and were shared with the Fairfax County Parkway Widening project team.

Preliminary analyses were completed using Synchro software to understand which movements at the intersections above experience the greatest delays. A comparative analysis was completed considering existing and proposed geometry and operations. **Table 7** provides an overview of the recommended improvements and the overall intersection LOS and delay reported from the comparative Synchro analyses. Also included in **Table 7** are the LOS and delay results for the signal modifications associated with the pedestrian enhancements described above along FCP at Route 50 and the Dulles Toll Road. **Appendix J** includes the Synchro HCM reports that detail LOS and delay results for each intersection.

The preliminary analyses from Synchro indicate potential benefits to operations can be expected for nearly all the recommended improvements. Only the intersections with pedestrian enhancements exhibit a nominal increase in overall intersection delay, but the overall intersection is expected to operate at LOS D or better. The proposed changes to signal operations at Rugby Road result in a nominal increase in delay during the PM peak hour, but similar LOS is expected among all movements compared to existing conditions, with overall intersection LOS D maintained.

While the results support the recommended improvements, the analysis tool used to evaluate the improvements (Synchro) does not perform well under saturated network conditions similar to those

during the peak hours along the Parkways. In addition, it does not capture driving behaviors, travel patterns, and other factors inherent to a constrained and oversaturated transportation network. Given the limitations of Synchro, a handful of locations were further evaluated using VISSIM software. The latter program is able to replicate the factors noted above and provide an indication as to the change in network congestion, incorporating vehicle queues, congestion points, and weaving conflicts in the vicinity of the intersections. The following intersections were further evaluated using VISSIM microsimulation software during the AM and PM peak periods:

1. FCP at Huntsman Boulevard
2. FCP at Burke Lake Road
3. FCP at Route 50 WB Ramp
4. FCP at Franklin Farm Road
5. FCP at Sunrise Valley Drive
6. FCP at Dulles Toll Road EB
7. FSP at Bonniemill Lane
8. FSP at Beulah Street

Note that during the VISSIM evaluation process, further modifications were made to proposed intersection geometry and signal timings at some locations given initial results. These further modifications are described in the following sections. Also, given the close intersection spacing of the eastbound and westbound ramps, the signalized intersection at the westbound Dulles Toll Road ramps was evaluated with the eastbound ramps.

Through the public involvement process, feedback regarding the intersection of Fairfax County Parkway with Old Plains Road helped to identify additional geometric and operational improvements beyond those listed in **Table 7**. Improvements were intended to provide access to the Fairfax County Parkway Trail and improve neighborhood access from Fairfax County Parkway. Ultimately, it was determined that a short-term solution could not be implemented. Access to neighborhoods with a single point of access to and from Fairfax County Parkway, such as Old Plains Road, will be evaluated as part of the Fairfax County Parkway/Franconia-Springfield Parkway Alternatives Analysis and Long-Term Planning Study.

**Table 7: Summary of Intersection Improvements and Comparative Synchro Analysis Results**

|                                       | Recommended Geometry and Operations*   | Overall Intersection LOS and Delay (seconds) |                          |                          |                          |                       |                    |
|---------------------------------------|--|--|--------------------------|--------------------------|--------------------------|-----------------------|--------------------|
|                                       |  | Existing                                     |                          | Recommended              |                          | Change in Delay (sec) |                    |
|                                       |  | AM   | PM                       | AM                       | PM                       | AM                    | PM                 |
| <b>FCP at Huntsman Boulevard</b>      | Restrict NB and WB LT movements, reroute to downstream median U-turn lane  | E<br>(56.3)                                  | F<br>(85.3)              | C<br>(31.4) <sup>1</sup> | D<br>(46.0) <sup>1</sup> | -24.9 <sup>†</sup>    | -39.3 <sup>†</sup> |
| <b>FCP at Burke Lake Road</b>         | Restrict SB and EB LT movements, reroute to downstream median U-turn lane  | D<br>(49.3)                                  | E<br>(61.2)              | D<br>(47.3) <sup>1</sup> | C<br>(26.3) <sup>1</sup> | -2.0 <sup>†</sup>     | -34.9 <sup>†</sup> |
| <b>FCP at Route 50 EB</b>             | Signalized NB to EB ramp (pedestrian improvement – see <b>Section 7.2.3</b> )  | A<br>(4.9)                                   | A<br>(2.5)               | A<br>(4.8)               | A<br>(2.4)               | 0.0                   | -0.1               |
| <b>FCP at Route 50 WB</b>             | Signalized WB to NB ramp (pedestrian improvement – see <b>Section 7.1.3</b> )  | A<br>(4.0)                                   | A<br>(7.6)               | B<br>(11.7)              | B<br>(13.8)              | 7.7                   | 6.2                |
| <b>FCP at Rugby Road</b>              | Triple WB LTs from Rugby Road to SB FCP (2 LT, 1 LT/TH, 1 RT), split phase operations  | E<br>(55.3)                                  | D<br>(47.3)              | D<br>(42.3)              | D<br>(49.7)              | -13.0                 | 2.4                |
| <b>FCP at Old Plains Road</b>         | Construct an acceleration lane for the eastbound right-turn movement   | C<br>(21.7) <sup>2</sup>                     | E<br>(44.1) <sup>2</sup> | N/A <sup>3</sup>         | N/A <sup>3</sup>         | N/A <sup>3</sup>      | N/A <sup>3</sup>   |
| <b>FCP at Franklin Farm Road</b>      | Reconfigure the EB approach as 2 LT, 1 TH, and 2 RT lanes <sup>4</sup>   | E<br>(58.2)                                  | F<br>(154.0)             | D<br>(46.9)              | F<br>(80.0)              | -11.3                 | -74.0              |
| <b>FCP at West Ox Road</b>            | Provide additional EB and WB capacity with a 2 <sup>nd</sup> TH lane in each direction   | E<br>(55.5)                                  | F<br>(85.3)              | D<br>(45.3)              | E<br>(60.0)              | -10.2                 | -25.3              |
| <b>FCP at Fox Mill Road</b>           | Provide a 2 <sup>nd</sup> NB and SB LT lane  | E<br>(55.2)                                  | E<br>(66.2)              | D<br>(47.5)              | D<br>(49.8)              | -7.7                  | -16.4              |
| <b>FCP at Sunrise Valley Drive</b>    | Reconfigure the WB approach to eliminate the channelized RT and provide 2 LT, 2 TH, and 1 RT lanes; reconfigure the NB approach to provide 2 LT, 2 TH, and 1 TH/RT lanes | E<br>(73.6)                                  | F<br>(107.2)             | E<br>(66.3)              | E<br>(72.5)              | -7.3                  | -34.7              |
| <b>FCP at the EB Dulles Toll Road</b> | Signalized NB to EB ramp (pedestrian improvement – see <b>Section 7.1.2</b> )  | D<br>(49.4)                                  | C<br>(20.3)              | D<br>(52.3)              | C<br>(21.1)              | 2.9                   | 0.8                |
| <b>FCP at Wiehle Avenue</b>           | Provide a 2 <sup>nd</sup> NB LT lane   | F<br>(101.9)                                 | D<br>(50.3)              | F<br>(90.8)              | D<br>(49.2)              | -11.1                 | -1.1               |
| <b>FSP at Bonniemill Lane</b>         | Restrict EB and WB LT movements, reroute to median U-turn/LT lane east of the intersection   | C<br>(32.9)                                  | C<br>(34.1)              | B<br>(14.6) <sup>1</sup> | B<br>(11.7) <sup>1</sup> | -18.3 <sup>1</sup>    | -22.4 <sup>1</sup> |
| <b>FSP at Beulah Street</b>           | Reconfigure the NB and WB approaches to include 3 NB LT and 3 WB TH lanes, perpendicular EB and NB RT lanes with overlaps  | E<br>(63.3)                                  | F<br>(83.6)              | D<br>(52.4)              | E<br>(67.8)              | -10.9                 | -15.8              |

\*LT – left turn, TH – through, RT – right turn

<sup>1</sup>Change in overall intersection delay does not account for increased travel time and signal delay for left-turn movements that are displaced to a downstream u-turn movement

<sup>2</sup>Unsignalized intersection; delay reported for the movement with the highest delay (eastbound right-turn) – change in delay not reported since proposed conversion to a signalized intersection

<sup>3</sup>No controlled movements to report delay at the intersection; any delay experienced by the eastbound right-turn movement would be associated with merging

<sup>4</sup>Further analyses using VISSIM software resulted in a change in the recommended approach geometry based on the initial analysis of the geometry listed in the **Table 7**

## MICROSIMULATION OF GEOMETRIC AND OPERATIONAL IMPROVEMENTS

Chapter 4 summarizes the traffic operations analysis completed as part of the assessment of existing conditions of the Parkways. To evaluate the potential benefit of the geometric and operational modifications outlined in **Section 7.3**, existing AM and PM peak period VISSIM networks were created to reflect the unique improvements at each location. This allowed for testing of the independent utility of each proposed improvement. VISSIM also allowed for an evaluation of the operational impacts to adjacent signalized intersections, which could not be accomplished using Synchro software. MOEs were reported from the simulation runs to allow for a comparison of delay, queuing, throughput, and travel time between the existing and modified networks. As mentioned, during the MOE review process, further modifications were made to proposed intersection geometry and signal timings at some locations given initial results. These further modifications are described in the following sections where applicable.

The following sections summarize the network modifications made for each location (e.g. geometry, operations, routing patterns), comparison of MOEs, and the planning level cost estimate to implement the improvements. Detailed MOEs can be found in **Appendix K**. A detailed discussion of the process by which planning level cost estimates were developed is provided in Section 8. For the purposes of the discussion of improvements, Fairfax County Parkway is referred to throughout as a north-south street despite the physical orientation in the east-west direction at some locations along the corridor.

### 7.1.4 FCP at Huntsman Boulevard

Huntsman Boulevard is a major local connection for the residential communities located between Fairfax County Parkway and Old Keene Mill Road, providing access to several neighborhoods and local schools. A median u-turn intersection is proposed at this intersection to reduce the number of vehicle phases served by the signal and allow for green time reallocation to movements with higher demand. Modifications to the intersection would include:

- Elimination of the northbound and westbound left-turn movements (and associated protected left-turn phases).
- Construction of a new u-turn signalized intersection to the north.
- Reconfiguration of the westbound approach to include two right-turn lanes and one through lane; right-turn-on-red assumed to be permitted from the right-most lane only.
- Elimination of split-phase signal operations; concurrent through movement phases programmed with a lagging protected eastbound left-turn phase.

**Figure 15** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- The overall intersection delay decreases by 7 seconds in the AM and 10 seconds in the PM.
- In the AM, delay for the southbound through movement (peak direction) decreases by 11 seconds while the delay in the northbound (off-peak) direction remains relatively consistent. In the PM, delay for the northbound through movement (peak direction) decreases by 5 seconds while the delay in the southbound direction decreases by 18 seconds.
- Queuing is reduced significantly along the Parkway for the peak movements, as maximum queues in the southbound direction are reduced by nearly 800 feet in the AM, and maximum queues in the northbound direction are reduced by nearly 2,500 feet in the PM.

- On the westbound approach, delay does increase for right turns in both the AM and PM, as westbound left-turn volume is now forced to turn right. However, this movement still operates with an acceptable LOS, with no increases in queueing in either peak hour.
- Delay at intersections upstream and downstream of Huntsman Boulevard remains relatively unchanged; in some instances, slight to moderate reductions in delay are observed due to optimizing of offsets.
- In the AM, local “segment” travel times (chosen between Roberts Parkway and Franconia-Springfield Parkway) remain relatively unchanged in the northbound direction and decrease by 1.5 minutes in the southbound direction; in the PM, segment travel times decrease by 0.4 minutes in the northbound direction and 0.5 minutes in the southbound direction.

Based on the results of the analysis, there is a benefit to intersection operations with the proposed median u-turn intersection, as this concept results in a reduction in overall intersection delay in both the AM and PM peak, especially for the southbound through movements; significant reductions in queueing for peak through movements (southbound in the AM and northbound in the PM); and improvements in segment travel times.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT HUNTSMAN BOULEVARD

#### EXISTING CONDITIONS

Huntsman Boulevard is a major local connection for the residential communities located between Fairfax County Parkway and Old Keene Mill Road, providing access to several neighborhoods and local schools. As a result, turning movements to and from Fairfax County Parkway at its intersection with Huntsman Boulevard demand a moderate portion of the signal green time. This conflicts with the high volume of through traffic during peak periods, which reaches nearly 2,800 vehicles in the southbound direction in the AM peak. Combined with the fact the signal operates with protected-permissive left-turn phasing and split-phase side street operations, the majority of intersection turning movements operate with significant delay, including through movements on FCP.

#### PROJECT DESCRIPTION

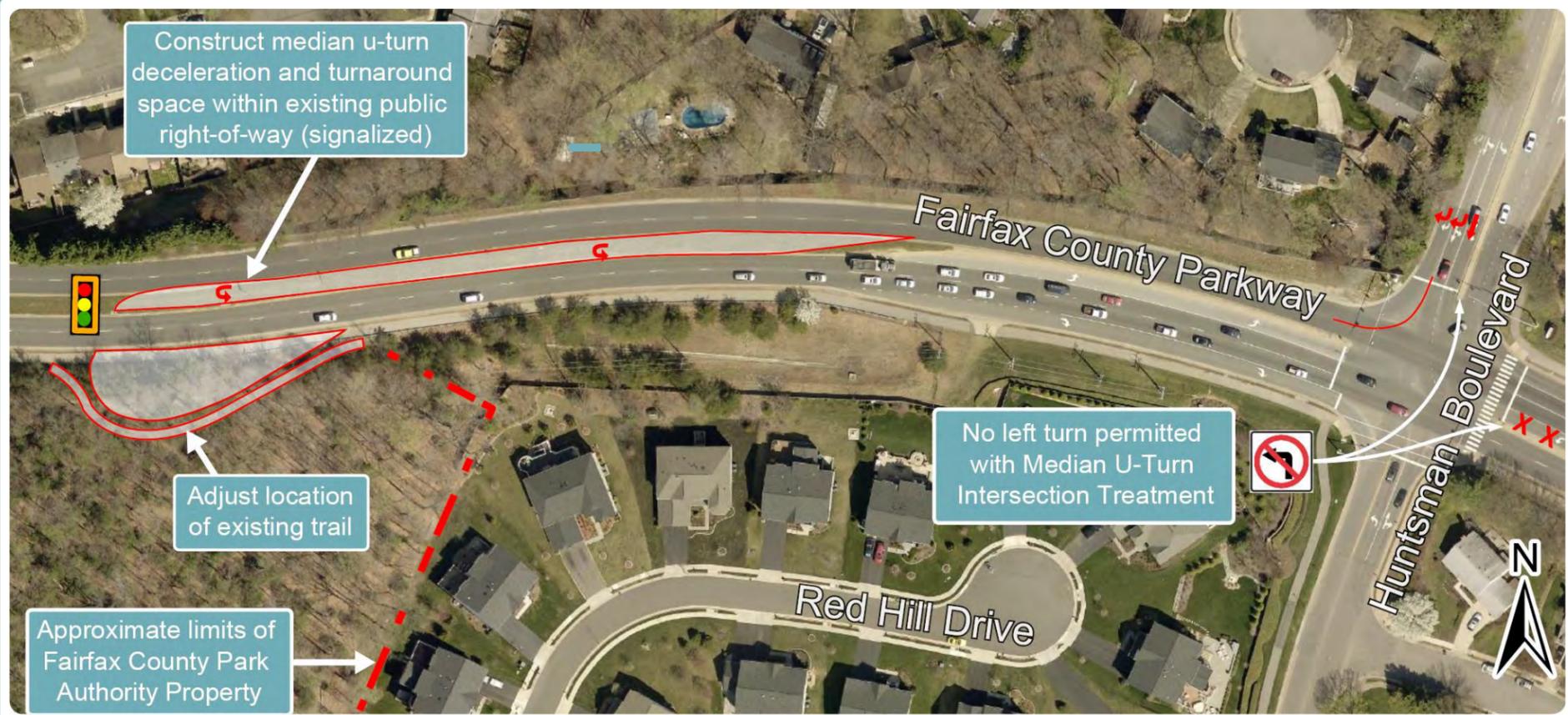
A median u-turn signal treatment is proposed at this intersection. This involves the elimination of the northbound and westbound left-turn movements, which are shifted to a new u-turn signalized intersection downstream (to the north) by way of the northbound through and westbound right-turn movements, respectively. Other improvements to the intersection not shown include pedestrian signals, high-visibility crosswalks, and ADA compliant improvements on curb ramps.

#### DESIGN CONSIDERATIONS

- Lane transition through the intersection for westbound through movement on Huntsman Boulevard
- Space and right-of-way requirements for turnaround (design vehicle) and trail
- Signage to guide vehicles to the u-turn signal, lane positioning upstream
- Traffic signal coordination will be required between the two signals
- Accommodation for upstream bike lane on Huntsman Boulevard
- Pedestrian crosswalk across north leg of FCP cannot be accommodated with dual right-turn lanes (none existing today)
- Education and enforcement will be necessary for this concept to be successful

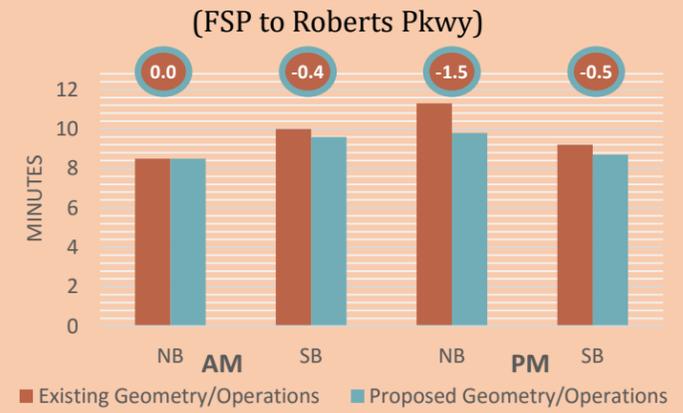
#### PROJECT BENEFIT

This project will reduce the number of vehicle phases served by the signal and allow for green time reallocation to movements with higher demand. This project also eliminates split phase operations along Huntsman Boulevard, which will improve the efficiency of intersection operations.



More information on median u-turn treatments can be found here: <https://www.fhwa.dot.gov/publications/research/safety/07033/>

#### FCP TRAVEL TIME COMPARISON



#### Travel Time Savings\*

- Annual AM peak period travel time savings of **2.0 hours**
  - Annual PM peak period travel time savings of **9.25 hours**
- \*based on vehicle hours traveled for mainline FCP volumes assuming 280 work days, 2 hour peak period

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

| Peak Hour Delay (seconds per vehicle) |                |
|---------------------------------------|----------------|
| AM Peak Hour                          | PM Peak Hour   |
| Existing: 21.2                        | Existing: 37.8 |
| Proposed: 13.8                        | Proposed: 28.1 |
| <b>-7.4 s</b>                         | <b>-9.7 s</b>  |

#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| NBT      | 0 feet       | -2475 feet   |
| SBT      | -775 feet    | -425 feet    |

#### OPINION OF PROBABLE COSTS

|            |             |
|------------|-------------|
| Low Cost:  | \$2,420,000 |
| High Cost: | \$3,990,000 |

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 15**

### 7.1.5 FCP at Burke Lake Road

Much like Huntsman Boulevard, Burke Lake Road serves as a link to several residential communities. It also functions as an east-west connection between the heavily traveled Route 123, Fairfax County Parkway, and Braddock Road. A median u-turn intersection is recommended similar to that proposed at Huntsman Boulevard; however, the turning movements modified included the eastbound and southbound left-turn movements. This treatment is intended reduce the number of vehicle phases served by the signal and allow for green time reallocation to movements with higher demand. Modifications to the intersection would include:

- Removal of southbound protected left-turn phase; left-turn lane converted to a 3<sup>rd</sup> through lane.
- Removal of eastbound protected-permissive left-turn phase; left-turn lane removed.
- Programming of concurrent side-street through movement phases.
- Construction of a new u-turn signalized intersection to the south.

**Figure 16** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- The overall intersection delay decreases by approximately 11 seconds in both the AM and PM.
- Northbound through-movement delay decreases by 6 seconds in the AM and 7 seconds in the PM, while southbound through-movement delay decreases by 16 seconds in the AM and 14 seconds in the PM.
- Maximum queues in the northbound direction are reduced over by 650 feet in the AM and 425 feet in the PM; maximum queues in the southbound direction are reduced by over 700 feet in the AM and PM.
- Queueing and delay along the eastbound and westbound (Burke Lake) approaches remain generally consistent or are reduced in both the AM and PM.
- In the AM, local “segment” travel times (chosen between Roberts Parkway and Huntsman Boulevard) remain relatively unchanged in the northbound direction and increase by 0.3 minutes in the northbound direction; in the PM, segment travel times decrease by 0.4 minutes in the northbound direction and 0.3 minutes in the southbound direction.

Based on the results of the analysis, there is a benefit to intersection operations with the proposed median u-turn intersection treatment. This concept results in a reduction in overall intersection delay in both the AM and PM peak, especially for the northbound and southbound through movements; reductions in queueing for the northbound and southbound through movements, and improvements in segment travel times in the southbound direction during both peak hours and in the northbound direction during the PM peak hour.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT BURKE LAKE ROAD

#### EXISTING CONDITIONS

Burke Lake Road serves as a link to several residential communities. It also functions as an east-west connection between the heavily traveled Route 123, Fairfax County Parkway, and Braddock Road. During peak periods, through volumes along Fairfax County Parkway exceed 1,800 vehicles per hour in both directions. The high cycle lengths operating along Fairfax County Parkway require a sizeable portion of the green time be allocated to the mainline in order to clear mainline queues each cycle. Given that four different phase sequences occur each cycle, accommodating all turning movements at the intersection is a challenge.

#### PROJECT DESCRIPTION

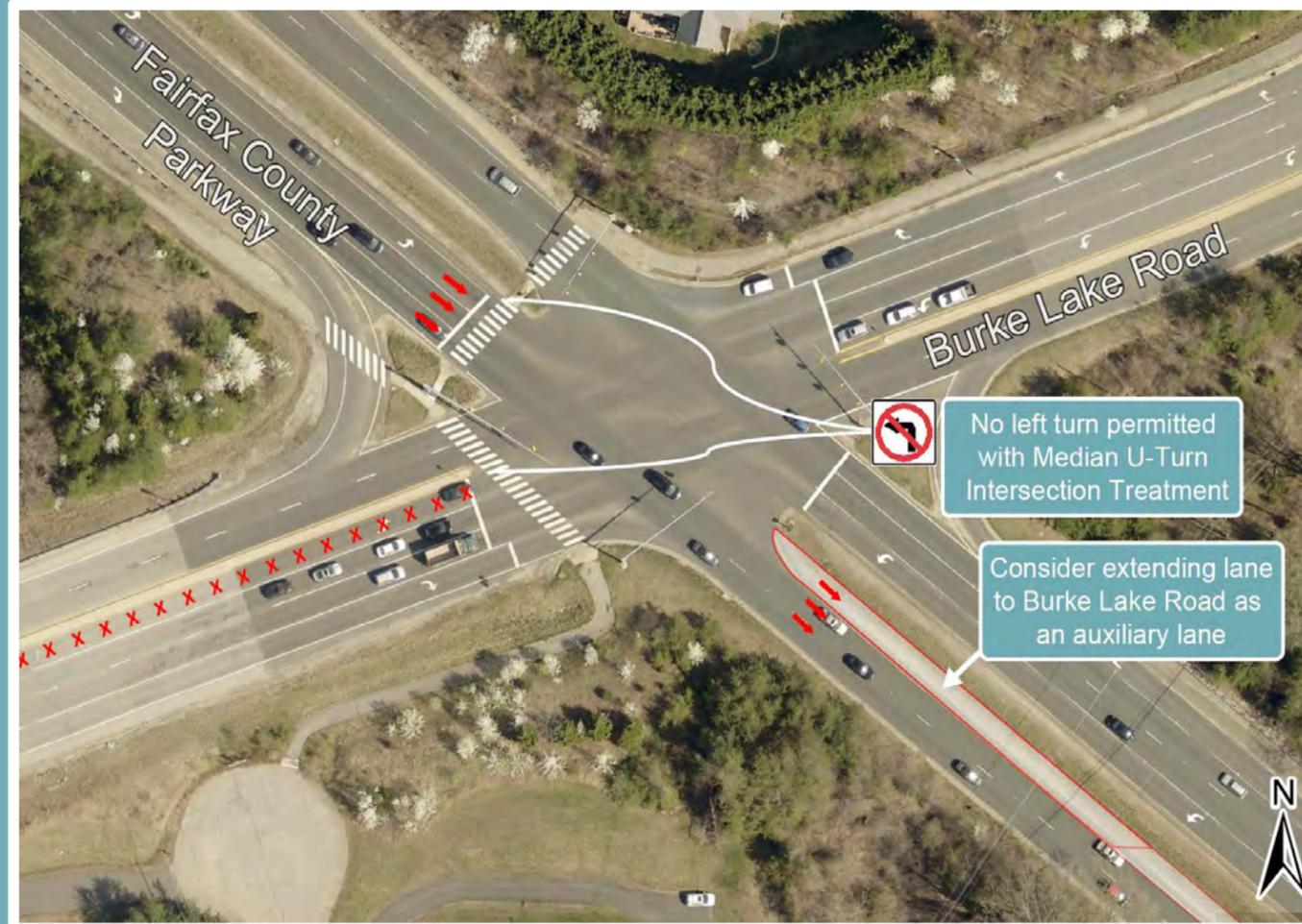
A median u-turn signal treatment is proposed at this intersection. This involves the elimination of the southbound and eastbound left-turn movements, which are shifted to a new u-turn signalized intersection downstream (to the south) by way of the southbound through and eastbound right-turn movements, respectively. Bike and pedestrian improvements not shown include trail signage and ADA-compliant facilities in addition to realigning the crosswalks perpendicular with the travel way.

#### DESIGN CONSIDERATIONS

- Increased stormwater runoff from the additional southbound through lane
- U-turn signal would be located along a vertical grade
- Space and right-of-way requirements for turnaround (design vehicle)
- Signage to guide vehicles to the u-turn signal, lane positioning upstream
- Traffic signal coordination will be required between the two signals
- Education and enforcement will be necessary for this concept to be successful

#### PROJECT BENEFIT

This project will reduce the number of vehicle phases served by the signal and allow for green time reallocation to movements with higher demand.



More information on median u-turn treatments can be found here: <https://www.fhwa.dot.gov/publications/research/safety/07033/>

#### Travel Time Savings\*

- Annual AM peak period travel time savings of **2.25 hours**
- Annual PM peak period travel time savings of **0.5 hours**

\*based on per-vehicle hours traveled during peak hour for mainline FCP or FSP assuming 280 work days

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

Peak Hour Delay (seconds per vehicle)

- AM Peak Hour
- Existing: 28.0
  - Proposed: 16.7

**-11.3 s**

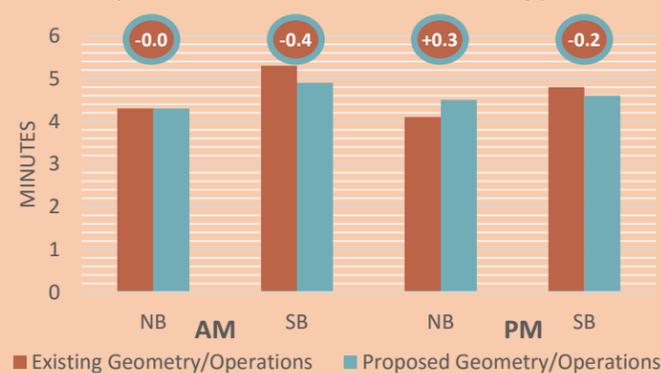
PM Peak Hour

- Existing: 32.5
- Proposed: 21.4

**-11.1 s**

#### FCP TRAVEL TIME COMPARISON

(Huntsman Blvd to Roberts Pkwy)



#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| WB RT    | -25 feet     | -100 feet    |
| NBT      | -650 feet    | -425 feet    |
| SBT      | -700 feet    | -725 feet    |

#### OPINION OF PROBABLE COSTS

Low Cost: \$1,740,000  
High Cost: \$2,760,000

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 16**

### 7.1.6 FCP at Route 50 Westbound Ramps

As mentioned in **Section 7.2.3**, modifications to the westbound off-ramp from Route 50 to the Fairfax County Parkway were identified to enhance the safety of the trail crossing. A VISSIM microsimulation evaluation of this location was completed to determine the level of queuing that could be expected for the westbound right-turn movement operating as a signal-controlled movement. The AM and PM peak hour right-turn volumes are approximately 400 vehicles per hour, which influenced the decision to implement dual right-turn lanes for this movement to control vehicle queues and reduce green time allocation for this movement. Modifications to the intersection would include:

- Removal of existing free-flow right-turn lane from the ramp from Route 50 westbound to FCP northbound.
- Addition of paving, restriping, and reconfiguration of signal control to locate two right-turn lanes adjacent to the two left-turn lanes at the existing signal for westbound off-ramp (which currently provides access to FCP southbound).

**Figure 17** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- Queue lengths increase for westbound and northbound approaches; however, westbound queues, mostly from right-turn traffic, are well within the ramp terminus, as maximum queues are approximately 300 feet.
- Travel time differences between existing conditions and the improvement scenario are marginal for both directions of travel in AM and PM peak periods.
- Overall intersection delays slightly increase, with most of delay incurred at the westbound and northbound approaches, in the AM and PM peak periods.
- The impacts to the adjacent intersections are minimal.
- Allowing right-turn-on-red for the right-turn lane adjacent to the shoulder provides more capacity to the right-turn movement when the northbound platoons are metered by the eastbound ramp signal.

The results of the analysis indicate that queuing for the westbound right-turn movement is contained to the ramp, with maximum queues of approximately 300 feet expected during the AM peak. The available storage for the ramp is over 1,000 feet to the gore with the Route 50 mainline. The results suggest there is ample capacity to accommodate right-turn queues without an impact to Route 50 mainline operations. The improvements eliminate the two conflict points between the trail crossing and the free-flow right-turns without causing queuing impacts to the off-ramp, and signal progressions through this intersection are not impacted during the peak periods.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT ROUTE 50 WESTBOUND RAMPS

#### EXISTING CONDITIONS

At Route 50, there are four ramp crossings along the northbound Fairfax County Parkway (FCP) lanes. Currently, only one of these ramps is controlled by a traffic signal – the remaining three operate as free-flow movements for vehicles. The design of the ramps allows vehicles to travel at high rates of speed, and the presence of roadside objects (e.g. barrier walls, foliage) limits the visibility of trail users in the crosswalk ahead. Two traffic signals operate along FCP at the interchange, controlling the left-turn movements from Route 50 to FCP.

#### PROJECT DESCRIPTION

The recommended improvement at the northern traffic signal would take advantage of the existing traffic signal by controlling the westbound Route 50 to northbound FCP on-ramp. In doing so, the crosswalk would be controlled with pedestrian signals and be provided exclusive right-of-way. Other improvements not shown include trail crossing signs and a high-visibility crosswalk with yield line.

#### DESIGN CONSIDERATIONS

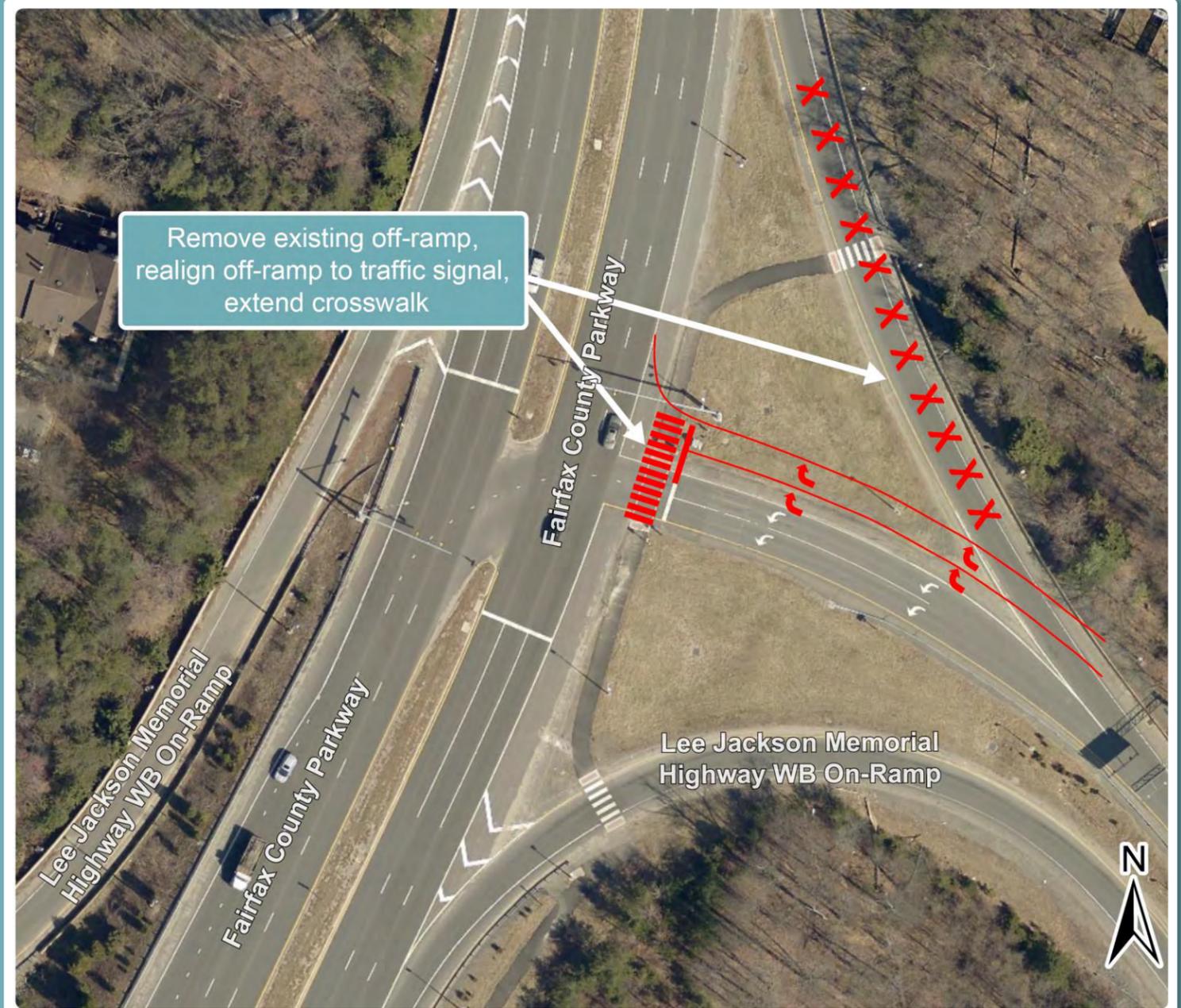
- Reduced speeds for Route 50 westbound to FCP northbound movement
- Space and right-of-way requirements for additional Route 50 westbound off-ramp right-turn lane
- Right-turn on red should be considered for right-turn lane adjacent to the shoulder to minimize queues
- Potential impact to overhead guide sign on Route 50 westbound off-ramp

#### PROJECT BENEFIT

This project will eliminate the unprotected pedestrian crossing across the FCP on-ramp and increase the visibility of trail users. This project also reduces the speed of vehicles traveling from westbound Route 50 to northbound FCP.

#### CHANGES IN PEDESTRIAN FACILITIES

| Existing                                      | Proposed                                  |
|---|---|
| • Unsignalized crosswalk across ramp          | • Single signal-controlled trail crossing |
| • Two trail warning signs                     | • High visibility crosswalk               |
| • High-speed approach from Route 50 westbound | • Low-speed vehicle turns at crosswalk    |
| • Two trail crossings at westbound approach   |   |



#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| WB RT    | +275 feet    | +275 feet    |
| NBT      | +125 feet    | +150 feet    |
| SBT      | -225 feet    | +175 feet    |

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

| Peak Hour Delay (seconds per vehicle) |                  |
|---------------------------------------|------------------|
| AM Peak Hour                          | PM Peak Hour     |
| • Existing: 5.7                       | • Existing: 6.4  |
| • Proposed: 9.6                       | • Proposed: 11.9 |

**3.9 s**

**5.5 s**

#### OPINION OF PROBABLE COSTS

|            |           |
|------------|-----------|
| Low Cost:  | \$310,000 |
| High Cost: | \$550,000 |

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 17**

### 7.1.7 FCP at Franklin Farm Road

The intersection with Franklin Farm Road experiences significant peak period queues, particularly in the eastbound direction during the PM peak hour. These queues correlate to lengthy delays for side street movements. To improve the capacity of the intersection, lane changes are proposed along the eastbound approach to the intersection. Modifications to the intersection would include:

- Construction of a second eastbound through lane.
- Construction of a second eastbound left-turn lane.
- Construction of second eastbound receiving lane to extend a total of 1,000 feet past the intersection.
- Adjustment of signal operations to provide a protected only left-turn phase for the dual eastbound left-turn lanes.

The initial improvements included dual left and right-turn lanes and single through lane. This approach configuration was identified based on the peak hour demand for each movement and input received from the public. Through several iterations of analysis, it was determined that the through movement queue did not clear each cycle and would subsequently block access to the right-turn lane. Thus, the two right-turn lanes provided were not being well utilized. It was determined that a single right-turn lane would provide sufficient capacity given the overlap with the northbound left-turn lane. The combination of these two outcomes of the preliminary microsimulation analyses contributed to the ultimate selection of the intersection approach geometry noted above.

**Figure 18** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- Overall intersection delay decreases by approximately 9 seconds in the AM and 75 seconds in the PM.
- Eastbound queues are reduced 325 feet and 3700 feet in the AM and PM peak hours, respectively.
- Northbound left-turn queues are reduced 450 feet and 300 feet in the AM and PM peak hours, respectively.
- Westbound queuing and delay remain consistent with existing conditions.
- Travel time on the segment from US Route 50 to Fox Mill Road decreases in the PM by 0.7 minutes in the northbound direction and 0.3 minutes in the southbound direction.

Based on the results of the analysis, the increased capacity of the eastbound approach improves total intersection performance in both the AM and PM peak hours. The dual through lanes allows left- and right-turning vehicles to queue in the storage lanes without being blocked, providing additional capacity for the turning movements. As a result, additional green time can be allocated to the mainline to reduce delay, queuing, and travel time in the northbound and southbound directions.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT FRANKLIN FARM ROAD

#### EXISTING CONDITIONS

Franklin Farm Road is one of four east-west connections between Centreville Road and West Ox Road/Reston Parkway, which are two major north-south arterials that parallel Fairfax County Parkway. The travel demand along Franklin Farm Road along the eastbound approach exceeds the capacity and creates significant peak period queues.

#### PROJECT DESCRIPTION

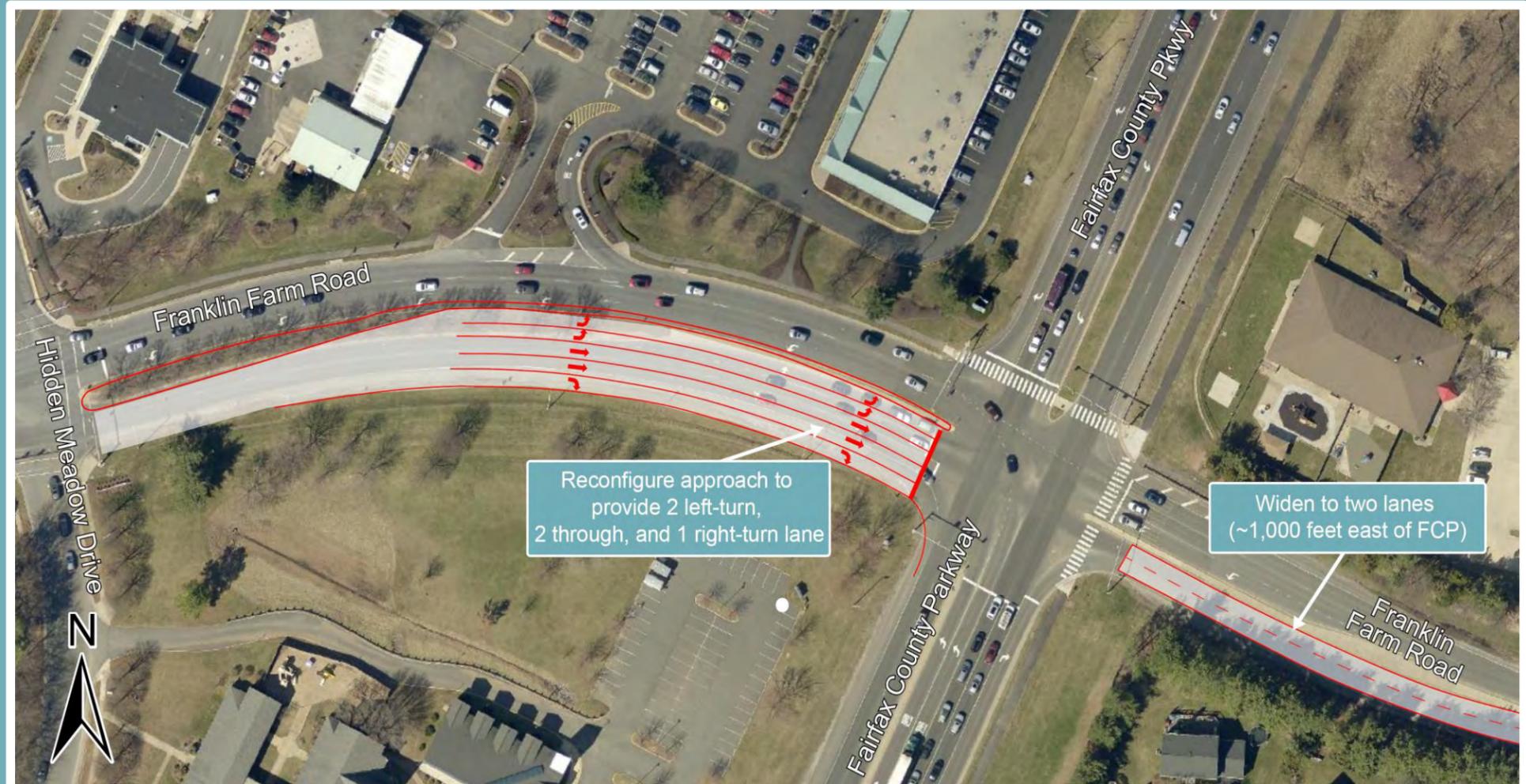
To improve the capacity of the intersection, additional left turning lanes and through lanes are proposed along the eastbound approach. The existing median would be shifted north to repurpose one of the westbound departure lanes as an eastbound approach lane, and an additional lane would be constructed in the existing shoulder for right-turns. This would provide a total of two left-turn lanes, two through lanes, and one right-turn lane. The east leg receiving lanes would be extended to a total of 1,000 feet to allow distance for eastbound through vehicles to merge into a single lane. Other improvements not shown are adding detectable warning surfaces to the pedestrian path through the median and extension of the southbound left-turn, southbound right-turn, and northbound left-turn lanes.

#### DESIGN CONSIDERATIONS

- West leg median modifications
- Space and right-of-way requirements for the eastbound approach and receiving lanes
- Traffic signal coordination is recommended between Hidden Meador Drive and Fairfax County Parkway
- Traffic signal modifications

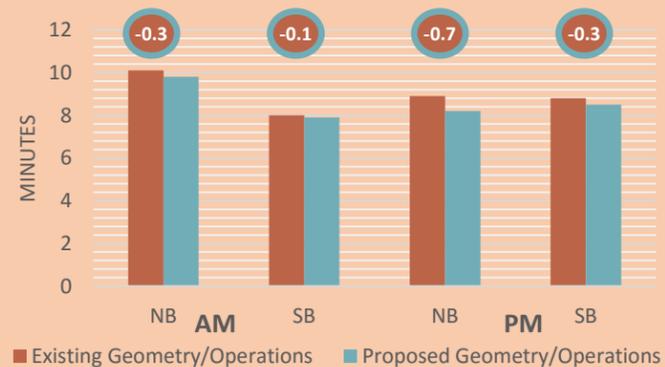
#### PROJECT BENEFIT

This project will increase the eastbound storage capacity. This will result in decreased vehicle queue lengths as more vehicles will be served during a signal cycle. The additional eastbound through lanes enables left-turning vehicles to reach the turn lane without being blocked by the through movement queue. It will also allow for green time reallocation to movements with higher demand.



#### FCP TRAVEL TIME COMPARISON

(Fox Mill to New Dominion Pkwy)



#### Travel Time Savings\*

- Annual AM peak period travel time savings of **1.75 hours**
- Annual PM peak period travel time savings of **5.0 hours**

\*based on per-vehicle hours traveled during peak hour for mainline FCP or FSP assuming 280 work days

#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| EB       | -325 feet    | -3700 feet   |
| NBT      | -450 feet    | -325 feet    |
| NBL      | -1000 feet   | -150 feet    |
| SBT      | -525 feet    | -400 feet    |

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

Peak Hour Delay (seconds per vehicle)

AM Peak Hour

PM Peak Hour

- Existing: 49.8
- Proposed: 40.4



- Existing: 115.8
- Proposed: 40.9



#### OPINION OF PROBABLE COSTS

Low Cost: \$1,470,000  
 High Cost: \$2,340,000

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 18**

### 7.1.8 FCP at Sunrise Valley Drive

The intersection of Sunrise Valley Drive at Fairfax County Parkway experiences recurring congestion during the weekday peak period commuting hours. Congestion occurs along the mainline of Fairfax County Parkway as well as the side street approaches of Sunrise Valley Drive. Capacity improvements were identified to increase the throughput of the intersection and reduce delay for all movements. The proposed modifications to the intersection included:

- Conversion of the northbound right-turn lane to a shared through and right-turn lane to provide an additional lane of capacity through the intersection.
- Provision of an additional westbound through lane to increase the capacity of the westbound approach. This also provides more operational flexibility (split phase would no longer be required).
- Shift of the westbound right-turn lane to accommodate the additional through lane, operating with an overlap phase with the southbound left-turn movement.
- Optimization of signal timings in conjunction with upstream and downstream intersections.

The initial improvements also included converting the southbound right-turn lane to a southbound shared through and right-turn lane and a receiving lane in the southbound direction (approximately 1,500 feet). However, the evaluation did not indicate a significant benefit to southbound operations, with queues approaching the eastbound Dulles Toll Road intersection. This was primarily attributed to the fact that the high southbound through volume was sharing the outside lane with right-turning traffic, which has an hourly turning volume of more than 450 vehicles during both peak hours. This proved to be less efficient at processing vehicles than the current southbound approach geometry.

The VISSIM models were reconfigured to match the existing geometry on the southbound approach, retaining the proposed improvements on the northbound approach. Combined with the signal timing modifications to operate the side street approaches with protected left-turn movements, the results of the analysis demonstrated that a significant improvement in intersection operations can be expected.

**Figure 19** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Note that these results incorporate modifications made at the intersection with the Dulles Toll Road eastbound ramps immediately to the north, which are described in the next section. Summarized below are key results from the analysis:

- Significant southbound travel time benefits are expected during the PM peak period due to revised signal timings at Sunrise Valley Drive and improved coordination with the signals at the Dulles Toll Road. Improved progression through these intersections results in shorter residual queues and a nearly four-minute reduction in travel time for the localized segment between New Dominion Parkway and Fox Mill Road. A smaller reduction in southbound travel time is observed during the AM peak hour (0.4 minutes), while northbound travel times remain relatively consistent during both peak hours.
- Eastbound delays decrease by 8 seconds during the AM peak hour and 12 seconds during the PM peak hour despite the new side street phasing. The geometry and phasing improvements result in large delay and queue reductions. Westbound approach delay decreases by 267 seconds during the PM peak hour and the existing westbound recurring queue is reduced by nearly half a mile (approximately 2,800 feet).
- Reducing the bottleneck through the Dulles Toll Road interchange and Sunrise Valley Drive intersection pushes more demand to the intersections to the south in the PM. While overall

intersection delays at neighboring intersections remain similar to existing condition, southbound turning movements delays generally increase between 5-10 seconds.

Based on the results of the analysis, there is a significant benefit to intersection operations as well as the signal progression between the Dulles Toll Road ramp intersections and Sunrise Valley Drive during PM peak period with the proposed intersection treatment and timing modification.

### 7.1.9 FCP at Dulles Toll Road Eastbound Ramps

As mentioned in **Section 7.2.2**, modifications to the eastbound on-ramp to the Dulles Toll Road from Fairfax County Parkway were identified to enhance the safety of the trail crossing. A VISSIM microsimulation evaluation of this location was completed to determine the level of queuing that could be expected for the northbound right-turn movement operating as a controlled movement. The AM peak hour right-turn volume is just over 400 vehicles per hour. Considering the other high-volume turning movements of the southbound left (800 vehicles per hour) and eastbound left-turn (745 vehicles per hour), changing the operating mode for the northbound right-turn movement could have an impact on mainline operations.

**Figure 20** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Note that these results incorporate modifications made at the intersection with Sunrise Valley Drive immediately to the south, which are described in the previous section. Summarized below are key results from the analysis:

- Average northbound right-turn queues at the eastbound ramp intersection can be accommodated within the turn bay, with maximum observed queues of 900 feet during the AM peak hour.
- While the northbound right-turn delay increases by approximately 18 seconds during the AM peak hour, overall intersection delay increases by only 3 seconds. Lesser delay increases are expected during the PM peak hour.
- Signal progression is improved within the ramps due to the reduced queue impact from Sunrise Valley Drive.

The results of the analysis indicate that average queuing for the northbound right-turn movement is contained to the 600-foot storage lane during the AM peak hour; however, maximum queues could extend beyond the available storage. This occurs while the red signal would be displayed for the northbound approach when vehicles approaching the intersection are preparing to stop. Much lower conflicting demand occurs during the PM peak hour, so even lesser queues are expected. Consideration for extending the turn lane may be necessary depending on the actual operations of the intersection with the recommended improvements.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT SUNRISE VALLEY DRIVE

#### EXISTING CONDITIONS

The intersection of Sunrise Valley Drive at Fairfax County Parkway experiences recurring congestion during the weekday peak period commuting hours, with average intersection delays of more than one minute. Individual movements experience delays as high as three minutes. This can be attributed to the significant volume of through traffic along Fairfax County Parkway, which is in conflict with heavy turning volumes to and from Sunrise Valley Drive. In addition to the congestion, the free-flow right-turn movement from westbound Sunrise Valley Drive toward the Dulles Toll Road makes for a challenging crossing for pedestrians.

#### PROJECT DESCRIPTION

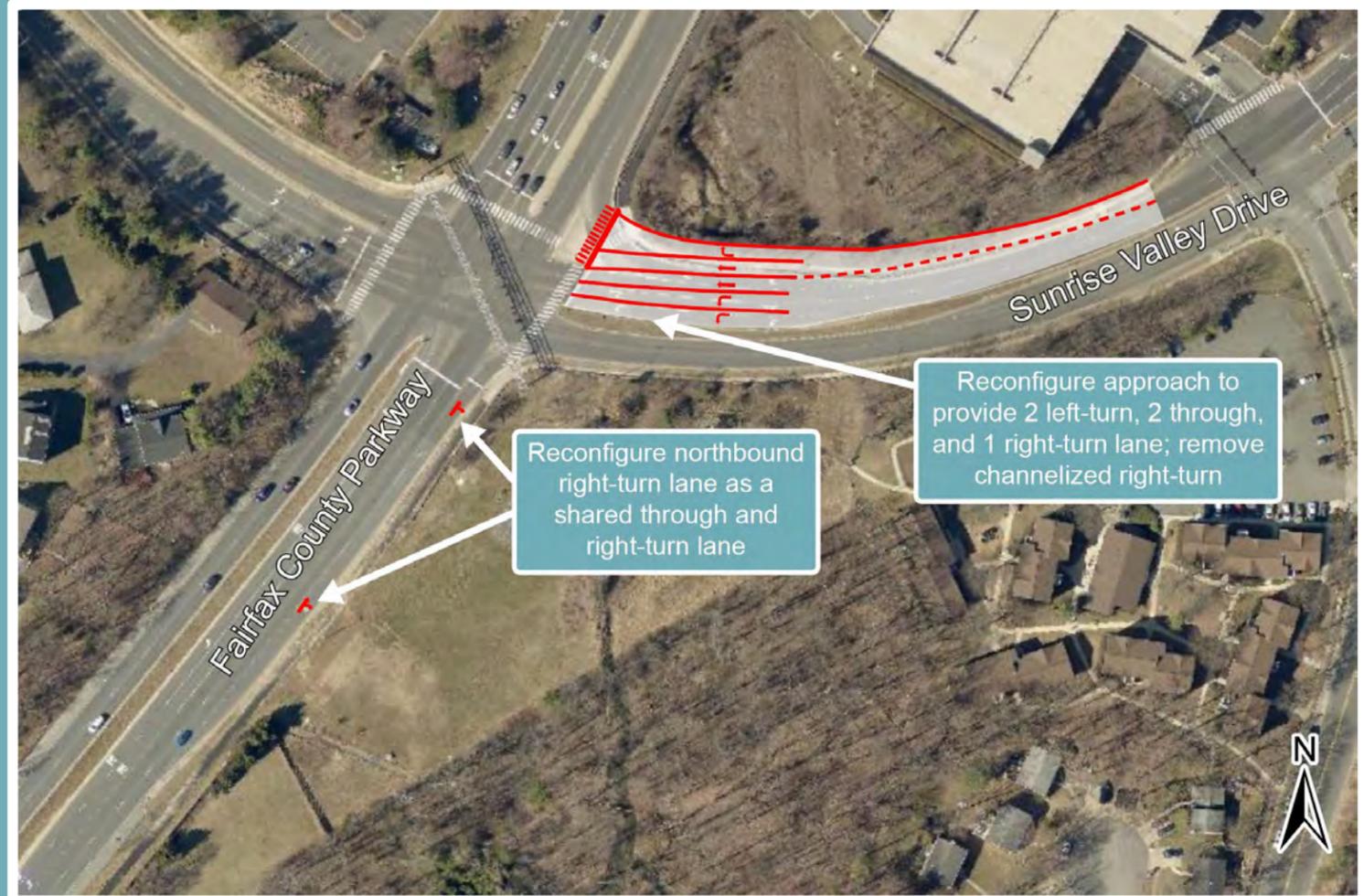
To improve the capacity of the intersection, geometric and operational changes are proposed along the north and westbound approaches to the intersection. The northbound right-turn lane would be converted to a shared through and right-turn lane. An additional westbound through lane would be added to allow for two left-turn lanes. Other improvements not shown include high-visibility crosswalks and additional guidance signs.

#### DESIGN CONSIDERATIONS

- Removal of the pedestrian island
- Reconfiguration of signal heads on overhead structure for the signal phase modifications
- Impacts to the stormwater pond in the northeast quadrant
- Space and right-of-way impacts along the westbound approach

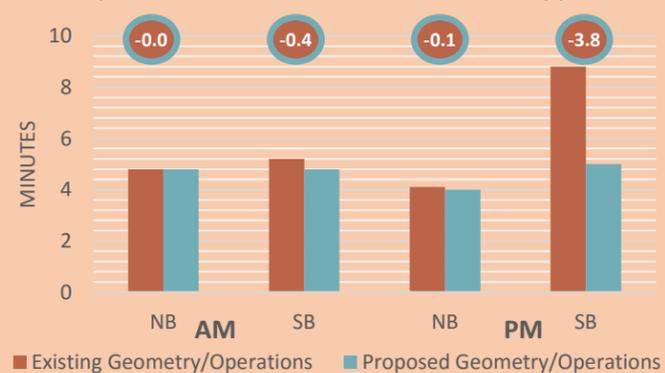
#### PROJECT BENEFIT

This project will increase the capacity of the northbound through movement with the addition of the third through lane in each direction. The additional westbound through and westbound left only lanes will also increase the capacity of the intersection and allow for flexibility in signal operations. The elimination of the free-flow right-turn lane on the westbound approach improves pedestrian and bicycle safety.



#### FCP TRAVEL TIME COMPARISON

(Fox Mill Rd to New Dominion Pkwy)



#### Travel Time Savings\*

- Annual AM peak period travel time savings of **2.0 hours**
- Annual PM peak period travel time savings of **20 hours**

\*based on per-vehicle hours traveled during peak hour for mainline FCP or FSP assuming 280 work days

#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| WB LT    | -25 feet     | -2775 feet   |
| NBT      | -125 feet    | -100 feet    |
| SBT      | 0 feet       | +150 feet    |

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

Peak Hour Delay (seconds per vehicle)

- AM Peak Hour
- Existing: 74.3
  - Proposed: 68.3

**-6.0 s**

PM Peak Hour

- Existing: 106.2
- Proposed: 52.4

**-53.8 s**

#### OPINION OF PROBABLE COSTS

Low Cost: \$990,000  
 High Cost: \$2,060,000

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 19**

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FAIRFAX COUNTY PARKWAY AT DULLES TOLL ROAD EASTBOUND

#### EXISTING CONDITIONS

This trail crossing is located along the on-ramp to Route 267 approximately 150 feet from the main travel lanes of FCP. The absence of signal control for the right-turn movement from FCP results in vehicles approaching the crosswalk at high rates of speed, limiting their ability to stop safely for trail users. Also, the location of the trail crossing is downstream from the intersection and is not where drivers typically expect to see a crosswalk.

#### PROJECT DESCRIPTION

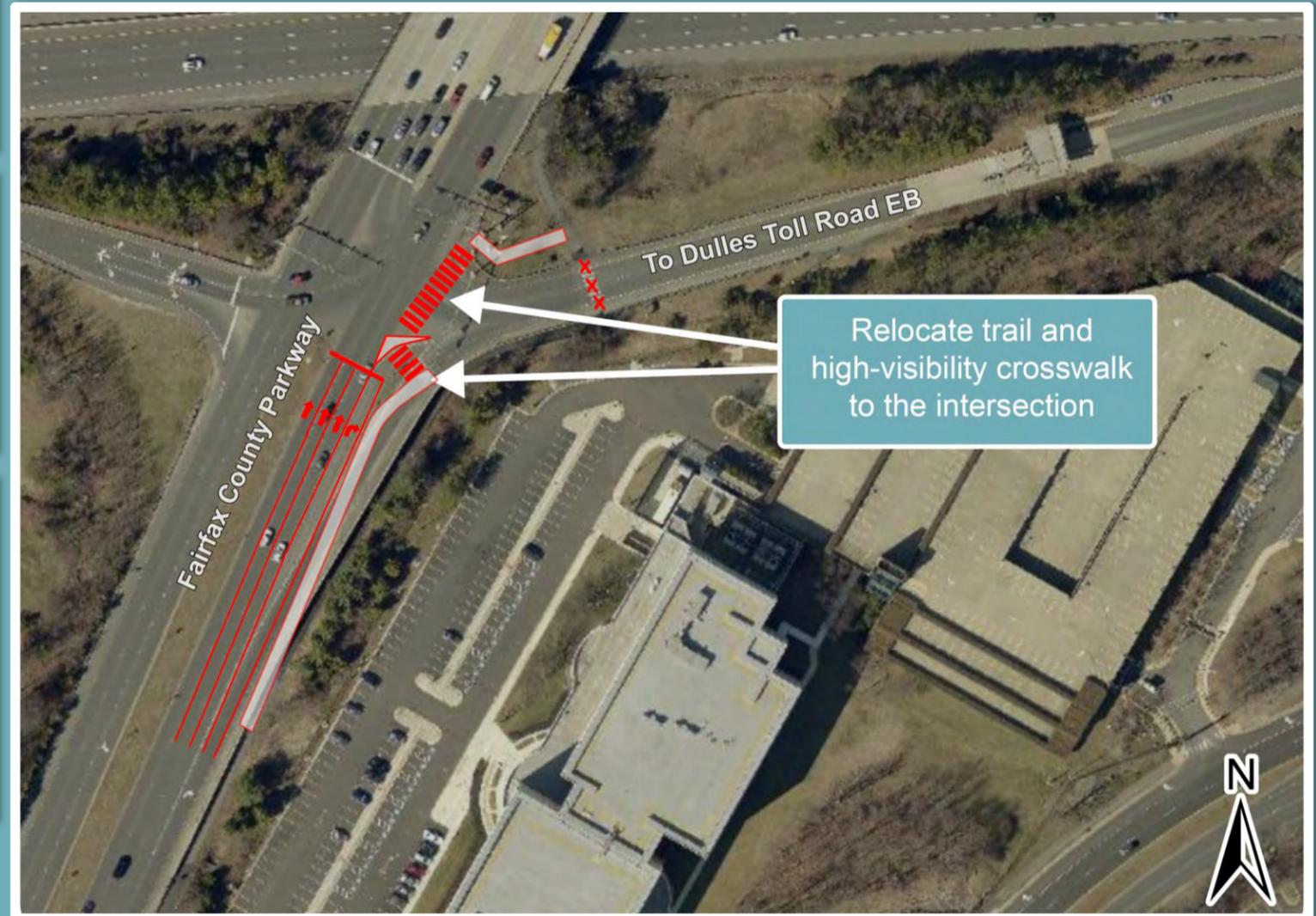
The recommended improvement reconfigures the right-turn movement to be perpendicular to the on-ramp to Route 267. The movement would be controlled by the signal and the approach angle would slow the speed of turning vehicles, increasing perception-reaction time on the approach to the crosswalk. The crosswalk would be relocated adjacent to the traffic signal and would include pedestrian signals. Other improvements not shown provide additional guidance signs to Route 267 in the northbound and southbound directions.

#### DESIGN CONSIDERATIONS

- Construction of pedestrian island on southeast quadrant of intersection
- Space and right-of-way requirements for signal equipment adjacent to northern crosswalk and along trail alignment
- Retaining wall, grading, and space requirements adjacent to northbound right lane
- Traffic signal modifications

#### PROJECT BENEFIT

This project will protect and provide higher visibility at the east leg pedestrian crossing. This project also reduces the speed of vehicles making turning movements onto the Route 267 on-ramp from northbound FCP.



#### CHANGES IN PEDESTRIAN FACILITIES

| Existing   | Proposed   |
|--|--|
| • Unsignalized crosswalk across ramp                     | • Signal controlled crosswalk  |
| • Two trail warning signs                                | • Perpendicular to intersection  |
| • High speed approach                                    | • Pedestrian island over channelized right-turn to eastbound 267             |
| • Obstructed view of trail entry due to grade separation | • High visibility crosswalk  |
|  | • Trail alignment is same grade with roadway improving trail user visibility |

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

| Peak Hour Delay (seconds per vehicle) |                  |
|---------------------------------------|------------------|
| AM Peak Hour                          | PM Peak Hour     |
| • Existing: 47.6                      | • Existing: 29.8 |
| • Proposed: 43.7                      | • Proposed: 27.9 |
| <b>-3.9 s</b>                         | <b>-1.9 s</b>    |

#### OPINION OF PROBABLE COSTS

|            |             |
|------------|-------------|
| Low Cost:  | \$1,020,000 |
| High Cost: | \$1,510,000 |

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 20**

### 7.1.10 FSP at Bonniemill Lane

Significant volumes along the Franconia-Springfield Parkway mainline in the peak direction (over 3,300 vehicles per hour (vph) eastbound in the AM and over 3,700 vph westbound in the PM) demand a significant portion of green time during the traffic signal cycle. Despite short vehicle split times to service mainline left-turns and side street movements, the high demand results in substantial mainline queues. To reduce red time for mainline operations, a median u-turn intersection treatment is proposed. This would displace the left-turn movements away from the intersection and turn over mainline operations more frequently. Modifications to the intersection would include:

- Removal of the eastbound protected left-turn phase; reconfiguring eastbound left-turn lane as a through lane (advance storage for the downstream u-turn lane).
- Construction of a median u-turn traffic signal approximately 500 feet east of Bonniemill Road.
- Provision of direct access to Hooes Road from the new traffic signal for westbound left-turn movements (no access provided from Hooes Road).

**Figure 21** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- Overall intersection delay and queue length decrease in the AM and PM peak hours.
- Mainline queues decrease by approximately 410 feet in the eastbound direction during the AM, and decrease by approximately 1,175 feet in the westbound direction during the PM.
- The southbound approach delay is also reduced more than 25 seconds in the AM and 16 seconds in the PM.
- Travel time in the segment from Beulah Street to Franconia-Springfield Parkway improves by 0.1 minutes eastbound in the AM and PM peak hours. Travel time also improves in the westbound direction by 0.2 minutes in the PM peak hour.

Based on the results of the analysis, there is a benefit to intersection operations with the proposed median u-turn intersection treatment. The peak direction delays and queues are reduced due to the additional time allotted to the eastbound and westbound through movements.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FRANCONIA-SPRINGFIELD PARKWAY AT BONNIEMILL LANE

#### EXISTING CONDITIONS

Average intersection delay at Franconia-Springfield Parkway and Bonniemill Lane is relatively low during both peak periods. Although side street service time is short, high demand on the mainline from downstream interchanges results in large eastbound and westbound queues, approaching one-quarter mile in length.

#### PROJECT DESCRIPTION

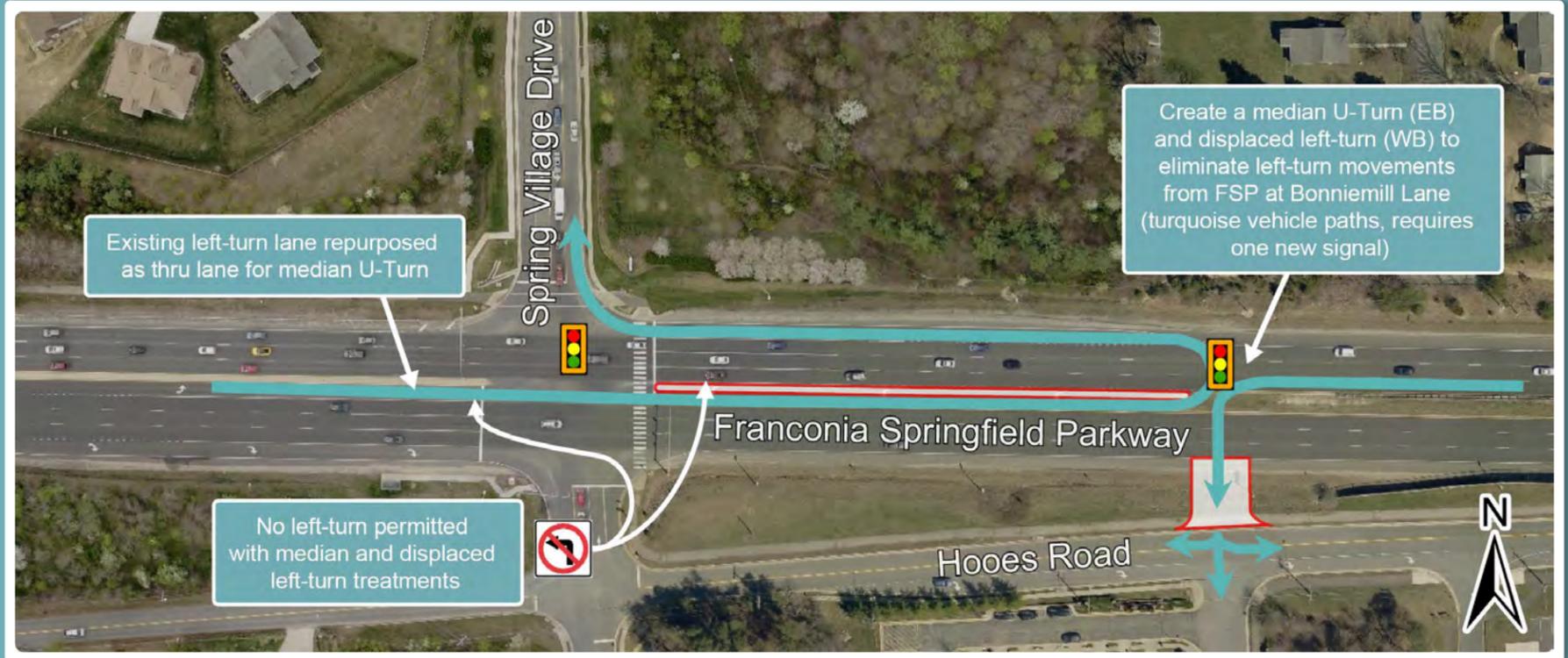
To improve signal efficiency, a displaced median u-turn and left-turn intersection is recommended approximately 500 feet to the east of the existing intersection at Bonniemill Lane. Eastbound left-turns onto Spring Village Drive would become u-turn movements at this new intersection, completing the original trip as a right-turn movement onto Spring Village Drive. Westbound left-turns would turn prior to the existing signal onto Hooes Road near the existing intersection at Manchester Woods. This would require a new connection from Franconia-Springfield Parkway to Hooes Road; however, it is proposed to be a one-way link, requiring that all existing trips to Franconia-Springfield Parkway continue to use the signal at Bonniemill Lane. Other improvements not shown include sidewalks, high-visibility and signalized crosswalks, trail guidance signs, and better visibility of traffic signals and guidance signs.

#### DESIGN CONSIDERATIONS

- Space and right-of-way requirements for turnaround (design vehicle)
- Signage to guide vehicles to the u-turn signal, lane positioning upstream
- Traffic signal coordination will be required between the two signals
- Education and enforcement will be necessary for this concept to be successful
- Reconstruction of median on the westbound approach
- Access changes with new connection to Hooes Road

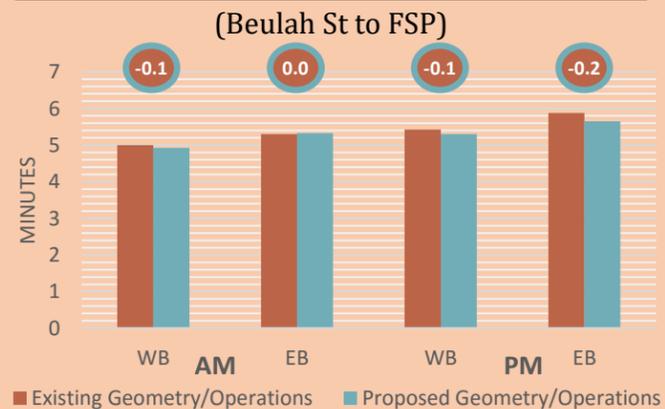
#### PROJECT BENEFIT

This project will reduce the number of vehicle phases served by the signal and allow for green time reallocation to movements with higher demand. This project also eliminates the left-turn phase along Franconia-Springfield Parkway, which will improve the efficiency of intersection operations as shown by lower queue lengths in the peak direction.



More information on median u-turn treatments can be found here: <https://www.fhwa.dot.gov/publications/research/safety/07033/>

#### FCP TRAVEL TIME COMPARISON



#### Travel Time Savings\*

- Annual AM peak period travel time savings of **15 minutes**
- Annual PM peak period travel time savings of **1.5 hours**

\*based on per-vehicle hours traveled during peak hour for mainline FCP or FSP assuming 280 work days

#### Changes in Queue Length (+/-)

| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| SB LT    | -50 feet     | -50 feet     |
| EB TH    | -400 feet    | -175 feet    |
| WB TH    | -100 feet    | -1175 feet   |
| EB LT*   | -200 feet    | -25 feet     |

\*eastbound left as compared from existing intersection left-turn to new median u-turn intersection movement at Hooes Road

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

Peak Hour Delay (seconds per vehicle)

| Time          | AM Peak Hour  | PM Peak Hour   |
|---------------|---------------|----------------|
| Existing      | 20.1          | 27.1           |
| Proposed      | 11.3          | 7.2            |
| <b>Change</b> | <b>-8.8 s</b> | <b>-19.9 s</b> |

#### OPINION OF PROBABLE COSTS

|            |             |
|------------|-------------|
| Low Cost:  | \$1,490,000 |
| High Cost: | \$2,490,000 |

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 21**

### 7.1.11 FSP at Beulah Street

The intersection of Beulah Street and Franconia-Springfield Parkway is a major junction for the surrounding residential communities as it provides one of the few east-west connections to points west of I-95. As a result, a significant volume of traffic uses this intersection on a daily basis. Its proximity to the Franconia-Springfield Metrorail Station also results in a higher volume of pedestrians and bicyclists using the intersection. A balance of operational and multimodal improvements were identified, including the following:

- Construction of a third northbound left-turn lane (operational improvement).
- Reconfiguration of channelized right-turn lanes for the eastbound, southbound, and westbound directions to perpendicular right-turn lane geometry (multimodal improvement).
  - In the westbound direction, the right-turn lane is also reconfigured to be a shared through and right-turn lane.
- Provision of right-turn overlap phases for the northbound, southbound, and eastbound right-turn movements (operational improvement).

**Figure 22** provides a summary of the intersection improvement concept along with high-level results from the VISSIM analyses comparing existing and proposed operations. Detailed results can be found in **Appendix K**. Summarized below are key results from the analysis:

- Improvements to the pedestrian facilities, when combined with operational improvements, do not greatly impact the overall delay of the intersection in AM and PM peak hours.
- Average and maximum queuing are reduced on all approaches in the AM and PM peak hour except for the eastbound approach in the PM peak hour, which remains consistent between existing and improved conditions.
- Average intersection delay at the intersection increases by 2 seconds, which is mainly attributable to the increase in delay for the northbound left-turn movement. The green time for the triple left-turns are reduced; thus, the northbound left-turns have to wait longer, although queues are cleared during each cycle.
- Adjacent intersections along Beulah Street also generally improve with reduced delays and vehicle queuing.
- Travel time along the segment of FSP from Beulah Street to Franconia-Springfield Parkway remains unchanged in the northbound and southbound direction during both the AM and PM peak hour.

Based on the results of the analysis, there is a benefit to intersection operations and safety with the proposed operational and bicycle/pedestrian treatments. The removal of the channelized right-turn lanes at all approaches allows for crosswalks. Additionally, the removal of channelized right-turns reduces the speed of vehicles turning, making it safer for pedestrians. Reduced queuing at the intersection also improves the conditions at adjacent intersections along Beulah Street.

### CORRIDOR MULTIMODAL SHORT-TERM IMPROVEMENTS – FRANCONIA-SPRINGFIELD PARKWAY AT BEULAH STREET

#### EXISTING CONDITIONS

The intersection of Beulah Street and Franconia-Springfield Parkway is the easternmost terminus of the study corridor. It is a major juncture for the surrounding residential communities as it provides one of the few east-west connections to points west of I-95. As a result, a significant volume of traffic uses this intersection on a daily basis. The high volume of conflicting movements results in significant delays and queuing for left-turn movements during the AM and PM peak periods. Additionally, the nearby Franconia-Springfield Metro station contributes to high pedestrian and bicycle volumes through the intersection.

#### PROJECT DESCRIPTION

Several intersection capacity improvements were identified that increase the throughput of high-volume movements and afford the reallocation of green time to movements where capacity improvements could not be accommodated. This included the construction of a third northbound left-turn lane and repurposing the westbound right-turn lane as a shared through and right-turn lane. In addition to these lane reconfigurations, the remaining approaches were reconfigured to provide perpendicular right-turn movements. This modification will eliminate the channelized right-turn movements which can be challenging for pedestrians to cross in the absence of a signalized crossing. It will also reduce right-turning vehicle speeds to make pedestrian crossings safer. Other improvements not shown include north and southbound bike line striping, additional vehicular guidance signs, near-side traffic signal displays, extended turn lanes, and supplemental pedestrian and bicycle crossing signs.

#### DESIGN CONSIDERATIONS

- Space and right-of-way requirements for additional northbound lanes
- Space and right-of-way requirements for northbound and southbound bicycle lanes
- Signal configuration with removal of pedestrian island signal posts

#### PROJECT BENEFIT

This project will provide safer pedestrian crossing by removing channelized right-turn movements and adding signals to control them. It will increase the capacity of the intersection with additional lanes and right-turn overlaps. This will allow for green time reallocation to movements with higher demand to offset delay caused by the removal of the channelized right-turns.

#### CHANGES IN PEDESTRIAN FACILITIES

| Existing   | Proposed   |
|--|--|
| • Unsignalized crosswalk across all right-turn lanes     | • Signal-controlled and high-visibility crosswalks |
| • Channelized right-turns results in high vehicle speeds | • North-south bicycle lane connectivity            |
| • No north-south bicycle lane connectivity               | • Reconstructed ADA-compliant curb ramps           |
| • Non ADA-compliant ramps                                | • Supplemental trail and pedestrian crossing signs |

#### Changes in Queue Length (+/-)

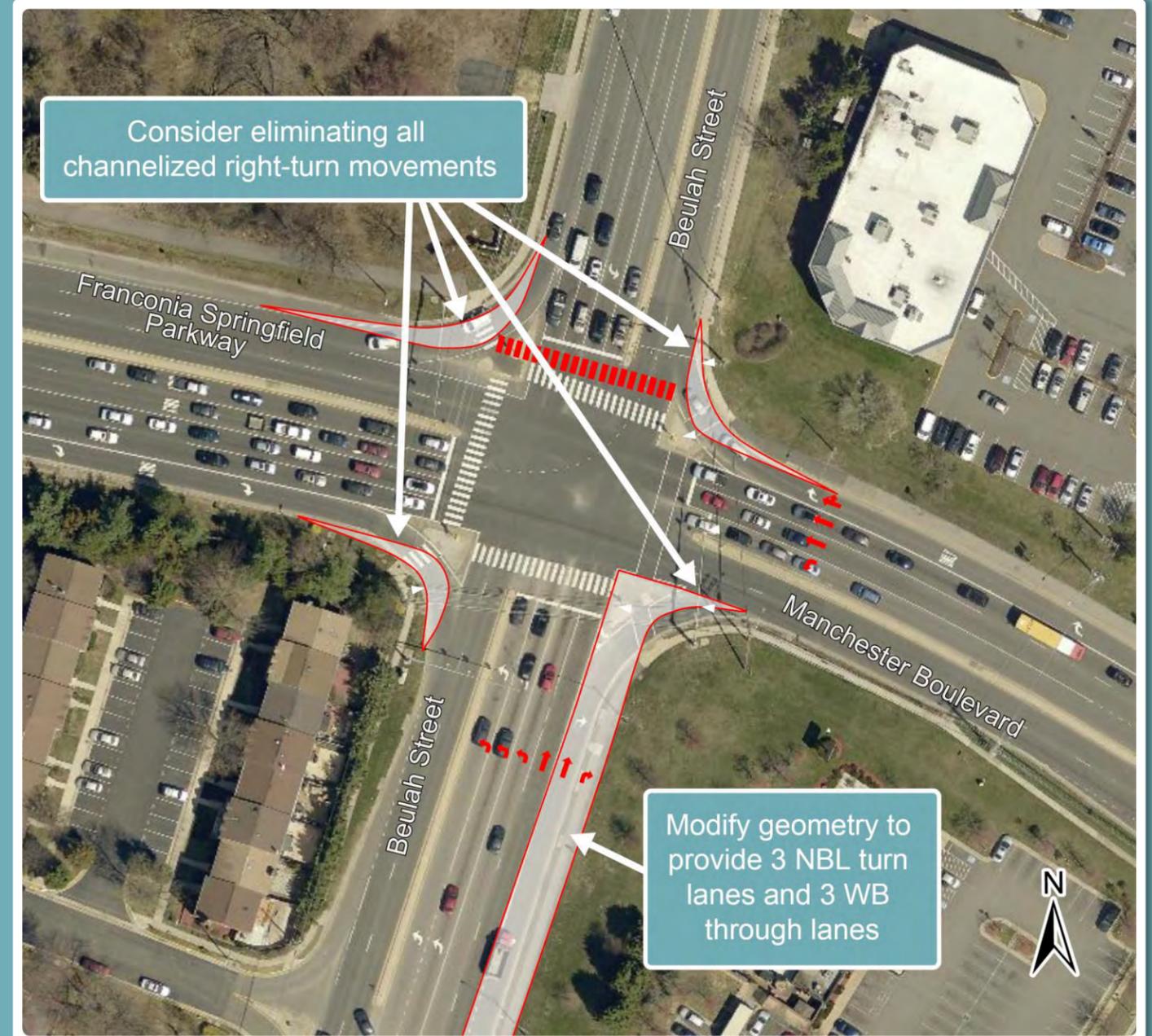
| Movement | AM Peak Hour | PM Peak Hour |
|----------|--------------|--------------|
| NB LT    | -50 feet     | -50 feet     |
| SB LT    | 0 feet       | -300 feet    |
| WBT      | -125 feet    | -225 feet    |

#### CHANGE IN OVERALL INTERSECTION OPERATIONS

| Peak Hour Delay (seconds per vehicle) |                  |
|---------------------------------------|------------------|
| AM Peak Hour                          | PM Peak Hour     |
| • Existing: 42.0                      | • Existing: 50.7 |
| • Proposed: 44.3                      | • Proposed: 49.9 |

2.3 s

-0.8 s



#### OPINION OF PROBABLE COSTS

|            |             |
|------------|-------------|
| Low Cost:  | \$3,020,000 |
| High Cost: | \$5,620,000 |

Includes all improvements (some may not be shown in the above graphic) at this location.

**FIGURE 22**

### 7.1.12 Summary of Improvement Microsimulation Analyses

Each of the improvements identified provides a benefit to local intersection operations. At some locations, the benefit to operations is in the form of reduced queuing, and others reduced travel times.

## CATEGORIZATION OF IMPROVEMENTS

Two primary categories of improvements were identified for the more than 350 transportation issues and corresponding mitigation measures. The categories were based on the nature of the improvement, the feasibility of implementing the enhancement, and external factors beyond the scope of this study. Below is a brief description of these categories.

4. **Existing Program Funding Opportunity** – VDOT has annual programmatic budgets for a variety of “routine” improvements and maintenance. These programs have the potential to quickly address small scale improvements, such as sidewalk ramp replacements, sign replacements, high visibility signal backplate installations, and pavement markings without the need for further engineering. Improvements that fall under this category could be implemented in a relatively short timeframe.
5. **Capital Improvement Program** – projects that don’t fall under the purview of the existing VDOT programmatic improvements were classified in this category. Typical projects include curb modifications, localized sidewalk/trail improvements, bus stop improvements, and intersection enhancements. The projects also tend to have a higher construction cost than programmatic projects; therefore, funding is typically not readily available and would need to be identified. Depending upon the scope of the improvement, there could be a need to acquire some private ROW or relocate utilities. Because of the lack of readily available funding and potential ROW/utility conflicts, improvements under this category could have an implementation timeframe of 2 to 10 years.

These two categories encompass nearly 90 percent of all the potential improvements identified. The remaining 10 percent of issues and corresponding improvements were not recommended for further consideration for one of two reasons. Either they were being accomplished through an ongoing study, design, or construction effort (e.g. I-66 Corridor Improvements Project), or they were evaluated for feasibility and benefit to operations and safety, but ultimately were not recommended to move forward for implementation.

The full list of improvements is summarized into an interactive PDF tool (**Appendix I**). For the capital improvement program improvements, these are identified in **Appendix I** with callout boxes displayed with a gold background. This tool was used during the public input process to communicate the issues and improvements graphically and by location. The tool allows the user to click on a location to find out information about the issues, identified improvements, and cost estimate. The summary of recommended improvements presented in this chapter and the associated appendices are intended as a planning tool for VDOT as resource allocation is programmed for upcoming fiscal years. It is important to note that this is a static document reflecting observed field conditions in 2014 and 2015. VDOT should perform an updated field review prior to implementation, particularly if implementation does not occur for several years. Similarly, given the number of different mechanisms to implement spot improvements, it is recommended that VDOT staff confirm the recommended improvement has not yet been completed.

## 8 PLANNING LEVEL COST EVALUATION

As part of the evaluation of multimodal short-term improvements, planning level cost estimates were developed for the implementation of the recommended improvements. The similarities between improvements mentioned in **Section 0** provided an opportunity to develop planning level cost estimates for a relatively small number of components that could then be applied repeatedly along the study corridor as opposed to doing a separate planning level cost estimate for each intersection. The planning level cost estimates for each of the recommended intersection improvements were compiled into a spreadsheet that can be found in **Appendix L**. Individual recommended improvements were classified by type of improvement and assigned an item number to allow for easier cost estimation and review of the spreadsheet.

### DERIVATION OF COSTS

Recommended improvements for each intersection were reviewed to identify necessary construction items. Some intersections had unique improvements that were evaluated on an individual basis, but far more had improvements that were comprised of similar construction components. Planning level cost estimates were derived for these similar components and then applied to individual intersections, adjusted for quantities.

Where possible, costs for these components were extracted from the VDOT Transportation and Mobility Planning Division (TMPD) Statewide Planning Level Cost Estimates tool, with a design year of 2017 used to inflate 2015 base-year costs. This tool is the source of cost estimates for larger items, such as constructing a sidewalk or shared-use path, modifying a traffic signal, or widening the road to install a turn lane. This tool provides a “low” and “high” estimate for the cost of these items based on previous projects completed in the Northern Virginia area.

Many of the operational and safety improvements are small construction items that cannot be evaluated using the TMPD tool. The costs for these components (referred to as non-standard items) were developed individually based on the following resources:

- The Fairfax County Department of Public Works Environmental Services Land Development Services 2016 Comprehensive Unit Price Schedule.
- The latest VDOT district averages for the NOVA district.
- Costs for previous projects completed in Fairfax County.
- Costs for similar projects completed around the state when specific references in Fairfax County were unavailable.

The costs developed using this method were designated as the “low” estimate, and the “high” estimate was assumed to be 120 percent of the “low” estimate.

For many of the proposed improvements, the individual components of the overall improvement, including items such as “replace curb ramps” and “install curb and gutter”, were themselves a compilation of other items, such as “demolition of concrete,” “full-depth asphalt pavement,” and so on. To normalize the development of cost estimates for improvements such as these, assumptions were made as to the average quantity of these smaller items that would be used in estimating the typical cost for the overall improvement. A detailed description of the assumptions and calculations used to develop costs for these non-standard components can be found in **Appendix L**.

The development of costs for non-standard items (outlined in **Appendix L**) was intentional such that improvements could be considered independently; however, many planning level cost estimate items

overlap between the different improvements identified at some locations. These overlapping improvements typically include curb ramps, crosswalk installations, and detectable warning surfaces. An example location is the intersection of Fairfax County Parkway at Reservation Drive with the following improvements:

1. Shift crosswalk closer to Fairfax County Parkway and change to high-visibility crosswalk across Reservation Drive
2. Replace existing curb ramps with latest ADA-compliant curb ramps (eight total)

Relocating the crosswalk as recommended in the first improvement would require the replacement of two existing curb ramps. If both improvements listed above are implemented, the cost of replacing two ramps would be accounted for in the first improvement; thus, the cost estimate developed for the second improvement would be overstated. Since the impact of overlapping construction items is limited to a handful of locations (less than ten), the total costs for each intersection do not consider these overlapping construction items, which results in conservative planning level cost estimates.

Unlike items from the VDOT TMPD tool, costs for components developed individually do not include costs for preliminary engineering (PE) and construction contingencies, maintenance of traffic, potential utility relocations, and other components inherent to roadway construction activities. Costs for these intangible costs were estimated by increasing the cost of the individually developed components for each recommended improvement by a fixed percentage. Assumptions for these intangible costs are summarized as listed below:

- 8% - Mobilization (used on all improvements)
- 10% - Construction surveying (omitted on small improvements like sign installations)
- 8% - Erosion and sediment control (omitted on simple sign installations and pavement marking improvements)
- 10% - Utilities (omitted on projects where utility conflicts seemed unlikely, like simple sign installations and striping)
- 15% - Maintenance of traffic (occasionally omitted for work done solely far from traveled way)
- 16% - Design (all but the simplest striping and signing improvements)
- 10% - Construction administration (used on all improvements)
- 25% - Professional Engineering and Construction Contingencies (25% is the value the VDOT TMPD tool uses)

Where ROW impacts are anticipated based on the scope of the recommended improvement, an additional increase in the component costs was applied consistent with the “Right of Way & Utilities Cost % of Cost Estimate” section of the VDOT TMPD tool.

## SUMMARY OF COSTS

Altogether, planning level cost estimates were completed for a total of 304 improvements at 79 different locations. The “low” cost to complete the full complement of identified improvements is estimated to be approximately \$30,981,000, with a “high” cost estimated to be \$49,962,000. This is inclusive of estimated costs for PE, construction, and where necessary, ROW. As noted in section in **Section 7**, improvements were categorized as programmatic or capital improvement program. This was intended to separate projects based on the type of funding mechanism that might be used to implement the improvement. The breakdown by funding type is summarized in **Table 8**.

**Table 8: Summary of Cost Estimates Based on Improvement Categorization**

|             | Programmatic<br>195 Improvements | Capital Improvement Program<br>109 Improvements | TOTAL        |
|-------------|----------------------------------|---|--------------|
| “Low” Cost  | \$4,000,100                      | \$26,980,000                                    | \$30,981,000 |
| “High” Cost | \$5,392,000                      | \$44,570,000                                    | \$49,962,000 |

Projects were also categorized based on the type of improvement: safety, operations, bicycle/pedestrian, or a combination thereof. **Table 9** provides an overview of the number of improvements and cost distribution for each category. As shown, 204 of the 304 improvements shown in **Table 9** will benefit bicyclists and pedestrians. Although this represents a majority of the improvements identified, the associated cost estimate is roughly 25 percent of the total for all improvements. This can be attributed to the lower cost of construction for the types of improvements identified for bicycle and pedestrian users of the trail. It should also be noted that only 304 improvements are included in **Table 9**. While more than 350 improvements were identified, as mentioned in **Section 7.5**, roughly 10 percent were not recommended for implementation because they were being accomplished through an ongoing study, design, or construction effort or were evaluated for feasibility and benefit to operations and safety, but ultimately were not recommended to move forward.

**Table 9: Summary of Cost Estimates Based on Type of Improvement**

| Type of Improvement              | Number of Improvements | “Low Cost”          | “High” Cost         |
|----------------------------------|------------------------|---------------------|---------------------|
| Safety                           | 52                     | \$2,040,000         | \$2,510,000         |
| Operations                       | 34                     | \$15,620,000        | \$25,330,000        |
| Safety and Operations            | 12                     | \$4,380,000         | \$8,380,000         |
| Bike/Ped                         | 135                    | \$4,520,000         | \$6,230,000         |
| Bike/Ped and Safety              | 69                     | \$3,890,000         | \$6,600,000         |
| Bike/Ped and Operations          | 1                      | \$1,000             | \$2,000             |
| Safety, Operations, and Bike/Ped | 1                      | \$520,000           | \$910,000           |
| <b>TOTAL</b>                     | <b>304</b>             | <b>\$30,981,000</b> | <b>\$49,962,000</b> |

Altogether, 13 locations have improvements that are identified as needing some amount of ROW. The estimated cost of acquiring ROW has been estimated for in the total cost estimate for these locations. To provide a general overview of the potential impacts to project delivery, **Table 10** summarizes the total potential ROW costs and provides an indication as to the locations with the highest estimated costs for ROW acquisition. As shown, nearly 95 percent of the improvements are not anticipated to require ROW acquisition. In addition, the total cost of these improvements is relatively the same as the cost for the 13 improvements that require ROW.

**Table 10: Summary of ROW Costs**

|                                    | Number of Improvements | “Low” Cost   | “High” Cost  |
|------------------------------------|------------------------|--------------|--------------|
| <b>Improvements without ROW</b>    | 291                    | \$17,281,000 | \$25,582,000 |
| <i>Improvement Costs Only</i>      | 13                     | \$8,970,000  | \$14,440,000 |
| <i>ROW Costs Only</i>              |                        | \$4,730,000  | \$9,940,000  |
| <b>Total Improvements with ROW</b> |                        | \$13,700,000 | \$24,380,000 |

The cost information presented above is intended as a planning tool as projects move forward to further study, design, and implementation. It is recommended that more detailed assessments of the requirements of the improvements be completed (i.e. design, quantities, and updated unit costs) through the implementation process such that a more refined cost estimate can be developed.

## 9 CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this study is to assess existing conditions and develop short-term multimodal improvements that can be implemented along the Parkways to address safety and operational issues. The recommended improvements were developed by gathering information from field observations, crash analyses, operational analyses, and public input. The outcome of this process is a comprehensive list of recommended improvements and associated planning level cost estimates, which are summarized in **Appendix I** and **Appendix L**, respectively. The total planning level cost of the improvements is estimated between \$30,981,000 and \$49,962,000.

The crash analyses demonstrate that the corridor generally has a lower crash rate than the statewide average for a similar type of facility. This is to be expected given the design of the roadway according to more current guidelines and standards. The bulk of the safety improvements identified through this project are relatively low-cost solutions, including high visibility signal backplates, warning signs, guide signs, and driver feedback information signs. The highest cost improvements identified were associated with geometric modifications at intersections to address queue spillback, which could influence the rate of rear-end collisions.

While the overall study area has a low crash rate, there are many challenges for pedestrians and bicyclists along the trail and the crossings. The majority (more than two-thirds) of the recommended improvements will enhance the safety for trail users.

Initial field observations at the onset of the study provided an indication of areas along the corridor that experience peak period congestion. This information was used to corroborate the results of the operational analyses, which demonstrated congested operations along several segments of the corridor, including the Dulles Toll Road and Sunrise Valley Drive intersections, Popes Head Road, the Sydenstricker Road interchange, and Richmond Highway. Considering the results of the analyses, local intersection mitigation solutions were identified where improvement projects have not already been programmed for planning, design, or construction. The results of detailed simulation analyses of the locations identified indicates that measurable benefits can be expected in terms of delay, travel time, and queue reductions.

It is recommended that the improvements identified in **Appendix I** be carried forward for implementation as funding resources become available. The categorical assignment of improvements is

intended to assist with the planning, prioritization, and identification of funding mechanisms to implement these improvements. As mentioned in **Chapter 7**, it is expected that capital improvement projects could require a longer duration to realize implementation of the improvement given the need for planning, design, and potential right-of-way acquisition. It is recommended that future planning, design, and construction projects that impact the study corridor consider the improvements identified, and where possible, include the implementation of the improvements as part of the project. Improvements should also be coordinated with the ongoing Fairfax County Parkway/Franconia-Springfield Parkway Alternatives Analysis and Long-Term Planning Study to confirm compatibility with any updates to the Comprehensive Transportation Plan Map.