FBI HQ Consolidation

FBI Headquarters
Consolidation

Appendix E: Draft Transportation Impact Assessment: Springfield

Appendix E

Federal Bureau of Investigation Headquarters Consolidation

Draft Transportation Impact Assessment

Springfield Site Alternative

Prepared by

for

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1.0 Introduction

This report presents the findings of the transportation impact assessment (TIA) prepared as part of the Environmental Impact Statement (EIS) that will guide the evaluation of alternatives for a new permanent location for a proposed consolidated Federal Bureau of Investigation (FBI) Headquarters (HQ).

This TIA was performed to determine whether the proposed exchange action of the existing FBI HQ and development of a new consolidated FBI HQ is likely to have a significant impact on transportation, as defined under the National Environmental Policy Act (NEPA).

Three site alternatives in the National Capital Region (NCR) are under consideration for the location of FBI's consolidated HQ. These sites include the Greenbelt site known as Greenbelt Metro Station, and the Landover site known as the former Landover Mall, both in Prince George's County, Maryland, and the Springfield site known as the United States (U.S.) General Services Administration (GSA) Franconia Warehouse Complex located in Fairfax County, Virginia. This study analyzes the transportation impacts of development of a new consolidated FBI HQ in Springfield, Virginia. Related TIAs examine the transportation impacts of developing a consolidated FBI HQ at two other alternative sites, while a third TIA examines the indirect impacts of the proposed exchange and future redevelopment of the existing FBI HQ at the J. Edgar Hoover (JEH) parcel in Northwest Washington, D.C. (see Appendices C, D, and B of the EIS). Future developers of the new consolidated FBI HQ would likely be required to conduct additional traffic impact studies according to the standards of the jurisdiction that result from changes to the proposed action and/or specific studies required for site plan approval and building or construction permits.

GSA proposes to convey its rights, title, and interests in a parcel (JEH parcel) located in Northwest Washington, D.C., in exchange for development of a new consolidated HQ at an alternative site. The proposed action constitutes a major Federal action that must be analyzed under the provisions of NEPA and Section 106 of the National Historic Preservation Act. Under NEPA, GSA must analyze the direct and indirect impacts of the proposed action.

To adequately analyze the direct impacts, GSA developed a conceptual site plan for the Springfield site that best meets and accommodates the purpose of and need for the project. The proposed conceptual site plan describes the nature and possible form of future development that may occur on the Springfield site to determine impacts of the proposed action. However, the final form and layout of the future HQ will be decided later in the process, after several other steps are completed.

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2.0 Background

Sections 2.1 and 2.2, respectively, introduce the proposed action and the purpose and need that have warranted this TIA. Section 2.3 outlines the NEPA requirements that initiated the evaluation of transportation impacts for the Springfield site, and the framework for evaluating the transportation impacts at this site under each alternative. Section 2.4 summarizes local land use plans within the study area. These plans establish a background for the remainder of the report and provide context for the evaluation of each alternative.

2.1 Proposed Action

The proposed action for the accompanying EIS encompasses two parts:

- acquisition of a consolidated FBI HQ at a new permanent location, and
- exchange of the JEH parcel.

The proposed action would allow GSA to leverage its current assets in exchange for property and services to support the space consolidation efforts of GSA and FBI. The exchange would convey the JEH parcel to the private sector consistent with local land use controls and redevelopment goals for Pennsylvania Avenue.

2.2 Purpose and Need

The purpose of the proposed action is to consolidate the existing FBI HQ offices into one location in the NCR and provide the FBI with an HQ that meets the Interagency Security Committee (ISC) Level V security standards. These standards are reserved for agencies with mission functions critical to national security or the continuation of government.

A consolidated FBI HQ is needed to support information sharing, collaboration, and integration of strategic priorities. Currently, the aging JEH building houses only 52 percent of HQ staff with the remainder dispersed over multiple locations in the NCR. Fragmentation resulting from FBI HQ's multiple locations diverts time and resources from investigations, hampers interoffice coordination, and decreases flexibility. Dispersion across multiple locations also gives rise to redundancy in operations and inefficient use of space. The consolidation is needed to eliminate redundancies and provide for significant space savings.

The proposed action is also needed to provide an FBI HQ that meets the ISC Level V security standards. Currently, FBI HQ elements are housed in the JEH building and in multiple locations in the NCR that do not meet the ISC Level V security standards. Additionally, the FBI needs a facility that supports the mission of the agency and allows the agency to defend against terrorists, weapons of mass destruction, and other threats. Additionally, as an integral agency for the management of intelligence and national security programs, the FBI needs an HQ that provides highly reliable utilities and infrastructure.

2.3 NEPA Requirements

Council on Environmental Quality (CEQ) regulations require that agencies analyze the potential direct and indirect impacts of the proposed action on the natural and human environment for each alternative, including a No-action Alternative. CEQ regulations define direct impacts as those "which are caused by the action and occur at the same time and place," and indirect impacts as those "caused by the action and are later in time... but are still reasonably foreseeable" (see 40 CFR § 1508.8[b]). Therefore, the EIS accompanying this TIA evaluates the direct and indirect impacts of the proposed action for each action alternative (Greenbelt, Landover, and Springfield) and for the No-action Alternative, which provides a baseline for evaluating the impacts of each action alternative. The four alternatives evaluated in the EIS are as follows:

- **No-action Alternative**: FBI HQ would not consolidate, and its staff and operations would remain dispersed throughout the NCR at JEH and other leased facilities.

- **Greenbelt Action Alternative**: FBI HQ staff and operations would be consolidated at the Greenbelt site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel are evaluated based on two reasonably foreseeable development scenarios (RFDSs).

- **Landover Action Alternative**: FBI HQ staff and operations would be consolidated at the Landover site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel is evaluated based on two RFDSs.

- **Springfield Action Alternative**: FBI HQ staff and operations would be consolidated at the Springfield site, and the JEH parcel would be exchanged to an exchange partner. The range of indirect impacts resulting from the exchange of the JEH parcel is evaluated based on two RFDSs. RFDSs are defined and described in detail in Section 2.5 of the EIS.

The exchange of the JEH parcel would be required to consolidate the FBI HQ at any of the sites under consideration; therefore, the exchange of the JEH parcel is a component of the proposed action common to each action alternative. This TIA analyzes the transportation conditions associated with the Springfield site only; an assessment of the impacts under the Springfield action alternative, which would include the exchange of the JEH parcel, is found in Section 4.2.9 of the EIS. To comprehensively evaluate transportation impacts for the Springfield site, this TIA evaluates the following conditions:

- Existing Condition: existing transportation system conditions, current to the year 2014.

- No-build Condition: future transportation system conditions assuming FBI HQ *is not* consolidated at the Springfield site for the horizon year of 2022.

- Build Condition: future transportation system conditions assuming FBI HQ *is* consolidated at the Springfield site for the horizon year of 2022.

- Build with Mitigation Condition: future transportation system conditions assuming FBI HQ *is* consolidated at the Springfield site for the horizon year of 2022 *and including* mitigation measures that would avoid or minimize adverse impacts on, or enhance the quality of, the natural and human environment.

The analysis presented in this report and summarized in Section 7.2.9 of the EIS details the evaluation of each condition for the Springfield site.

The No-build and Build Conditions at the Springfield site correspond to different alternatives, as shown in table 2-1. The No-build Condition at Springfield corresponds to the EIS No-action Alternative. The No-build Condition at Springfield also corresponds to the Greenbelt Action Alternative and the Landover Action Alternative because FBI HQ would not be consolidated at Springfield if either the Greenbelt site or the Landover sites are chosen. The Build Condition for Springfield corresponds to the EIS Springfield Action Alternative.

Table 2-1: Springfield Site Conditions Corresponding to Each Alternative

Alternatives Evaluated in the EIS	Springfield Site	
	TIA No-Build Condition	TIA Build Condition
No-action Alternative	x	
Greenbelt Action Alternative	x	
Landover Action Alternative	x	
Springfield Action Alternative		x

The analysis of the transportation impacts associated with the Greenbelt and Landover sites is found in Section 5.2.9 and Section 6.2.9 of the EIS, respectively, as well as in the corresponding TIAs. Indirect transportation impacts associated with the future development of the JEH parcel are found in Section 4.2.9 of the EIS and in the corresponding TIA.

Impacts associated with the alternatives are analyzed in the No-build and Build Condition sections. Potential impacts are described in terms of:

- **Type**: the positive or negative effects of an action – ***beneficial***, reducing congestion or barriers and/or improving travel patterns, safety, or travel time; ***adverse*****,** increasing congestion or barriers and/or degrading travel patterns, safety, or travel time.
- **Category**: the type of effects – ***direct effects*** are caused by the action and occur at the same time and place; ***indirect effects*** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- **Duration**: the length of time of the effects – ***short-term***, lasting during construction or up to one year after; ***long-term***, lasting more than one year.
- **Intensity**: see below

The thresholds for determining the intensity of effects on local pedestrian, bicycle, transit, parking, traffic networks, and truck access are guided by the following definitions:

- **Not Measureable** – a localized impact that is barely perceptible to most users.
- **Beneficial or Adverse** - a localized impact that is measurable to most users.
- **Adverse Major** – a broad area impact that is highly noticeable and would substantially affect a large numbers of network users.

Because both traffic and transit entail extensive analysis, more detailed impact thresholds have been established for these transportation modes. See table 2-2 for these specific impact thresholds. Any impact thresholds included in table 2-2 would be compared to the previous condition or the No-action/No-build Condition, or against the corresponding condition of another site.

Table 2-2: Traffic and Transit Impact Thresholds

Impact Thresholds	Traffic	Transit
Adverse Major	Delays impact corridors of the study area creating more of a regional impact dealing with several intersections that are key to the operation of the roadway. A corridor can be defined as several adjacent intersections along the same roadway providing a vital connection between roadways or important passage through a highly congested area.	An increase in transit ridership that creates modest passenger delays, measured as increasing volumes above Washington Metropolitan Area Transportation Authority (WMATA) thresholds for capacity at any combination of two of the following: individual Metrorail facility elements (vertical elements, faregate aisles, or platform capacity) or bus routes (including substantial delays from roadway operations.
Adverse	Delays are localized, such as at independent intersections.	An increase in transit ridership that creates minimal passenger delays, measured as increasing volumes above WMATA thresholds for capacity at any one of the following: individual Metrorail facility elements (farecard vending machines) or bus routes (including substantial delays from roadway operations).
Not Measurable	Delays are not perceptible to most users and the number of users is within capacity. Improvements to traffic operations (travel time, throughput, or delays) are also not perceptible to most users.	Condition would not degrade or improve transit capacity or change the overall transit level of service provided to users.
Beneficial	Improvements to traffic operations (travel time, throughput, or delays)	An increase in transit service or capacity for Metrorail facility elements (farecard vending machines) and/or bus routes (including reduced delays from roadway operational improvements).

2.4 Local Land Use Plans

2.4.1 Existing Land Use

The Springfield site currently operates as a GSA warehouse complex with 16 warehouse and storage buildings and associated asphalt-paved parking lots. Springfield Crossing and Extended Stay America, which are located adjacent to the site, across Metropolitan Center Drive, are multifamily residential and hotel, respectively. Other uses bordering the site are a variety of industrial and commercial office. A small parcel of undeveloped land is adjacent to the eastern site boundary. Transportation infrastructure is prominent in the site vicinity, and includes Henry G. Shirley Memorial Highway (I-95) to the west, Franconia-Springfield Parkway (VA Route 289) to the

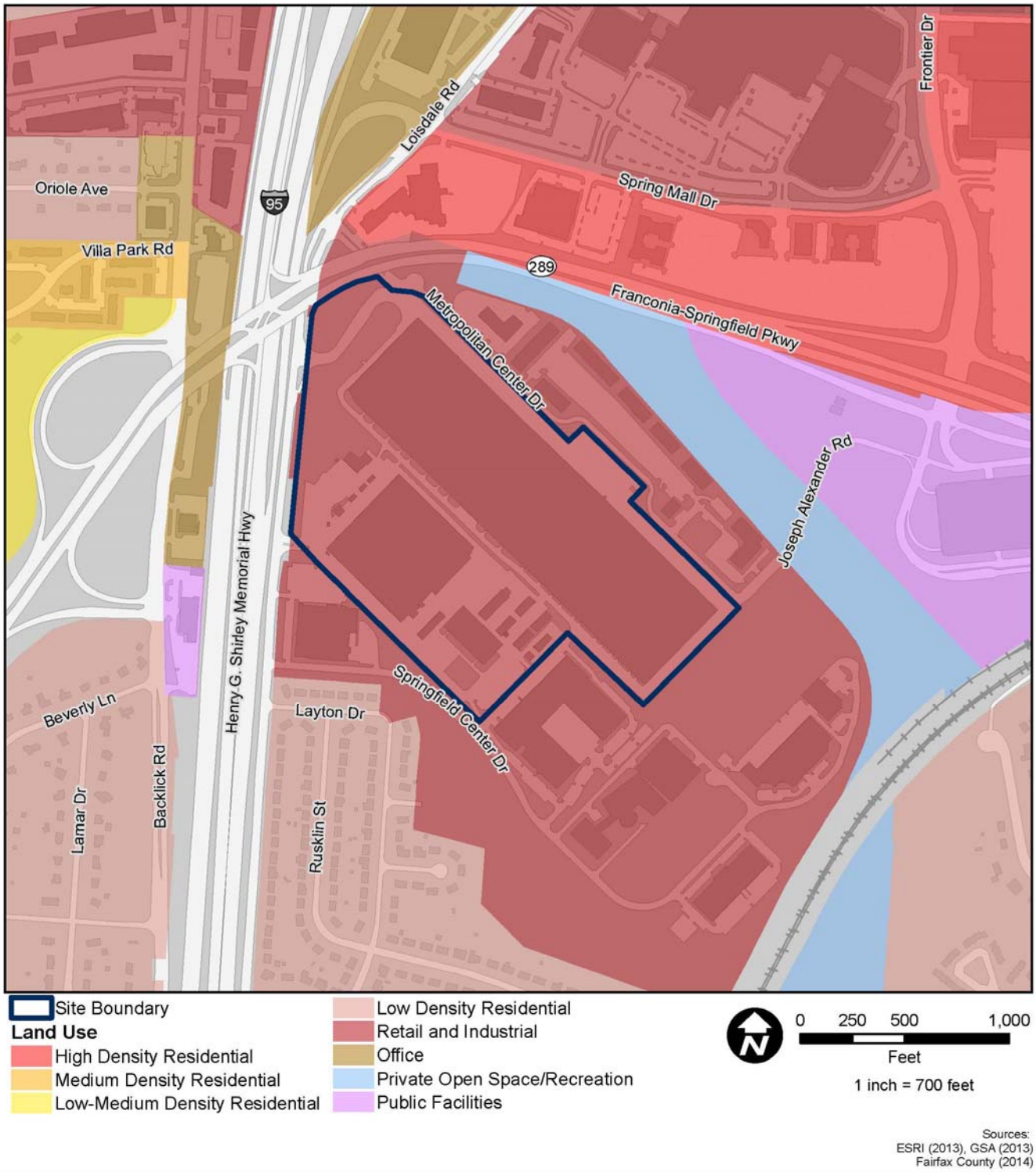
north, and the Franconia-Springfield Metro Station (also known as the Joe Alexander Transportation Center) and CSX rail lines to the east. Several lower density residential areas are found in the study area; Loisdale Estates is located immediately to the south. The major commercial center of Springfield, including Springfield Town Center, is located farther to the north and west of the site. Figure 2-1 illustrates land uses within 0.25 mile of the site.

2.4.2 Planning Context

The Springfield site is currently owned by GSA, and it is divided into two sections: (1) Building A and sprinkler house, referred to as the "GSA Side," and (2) Buildings B, C, D, and 1 through 12, referred to as the Logistics Operation Center (LOC) (GSA 2015a). Development of the Springfield site began in the early 1950s, and Buildings A and B were completed around 1953. Smaller, ancillary buildings were constructed at later dates. Buildings A and B are constructed with slightly elevated slab-on-grade floors and large wood truss roofs.

Until the early 1950s, the surrounding area remained undeveloped and comprised forested and agricultural properties. By 1953, a substantial roadway infrastructure had been built in the surrounding area including Interstate 95 (I-95) and Loisdale Road. In addition to Buildings A and B, driveways, parking spaces, and a railroad spur to a mainline east of the site were developed on-site. By 1969, the Springfield Mall was constructed to the north. A large residential development had been constructed to the south, in addition to an expansion of the adjacent lumber yard north and east of the site. By 2005, the lumber yard immediately north of the site was replaced by upscale residential development. Ongoing agency plans for the surrounding area include the Fairfax County Comprehensive Plan; the Franconia-Springfield Metro Station Vision Plan; and other transportation plans and studies that envision the redevelopment of Springfield as an inter-connected, mixed-use, and easily accessible place.

Figure 2-1: Springfield Existing Land Use Map



2.4.3 Federal Elements of the Comprehensive Plan for the National Capital

The Federal Elements of the Comprehensive Plan for the National Capital address matters related to Federal properties and interests in the NCR, which include the District of Columbia; Montgomery and Prince George's

Counties in Maryland; Arlington, Fairfax, Loudoun, and Prince William Counties in Virginia; and all cities within the boundaries of those counties. The Federal Elements were prepared pursuant to Section 4(a) of the National Capital Planning Act of 1952. The seven Federal Elements presented in the Comprehensive Plan are (1) Federal workplace, (2) foreign missions and international organizations, (3) transportation, (4) parks and open space, (5) Federal environment, (6) preservation and historic features, and (7) visitors. The National Capital Planning Commission (NCPC) develops and administers these Federal Elements, which were last updated in 2004 (NCPC 2004; GSA 2008).

The Federal Elements of the Comprehensive Plan for the NCR provide criteria for the location of Federal facilities and policies on Federal employment in the NCR. The goals of the elements regarding land use include:

- Maintain Washington, D.C., as the seat of the national government by enhancing the Federal workforce through efficiency, productivity, and economic well-being.
- Ensure Federal developments are compatible with adjacent neighborhood uses.
- Develop and maintain a multi-modal regional transportation system that meets the travel needs of residents, workers, and visitors.
- Conserve and enhance the park and open space system of the NCR.
- Promote an appropriate balance between open space resources and the built environment.
- Preserve and enhance upon the guiding principles of the L'Enfant and McMillan Plans.

The transportation policies included in the Federal Elements of the Comprehensive Plan are built upon the principles of transit-oriented development and smart growth (NCPC 2004). In conjunction with the location and design policies of the Federal Element, the transportation policies focus on maximizing the access of federal facilities to the region's extensive transit system. Goals regarding transportation for the NCR area include increased capacity and connectivity, congestion management and improved air quality, balanced land use and smart growth, and transportation options beyond the private automobile.

2.4.4 Fairfax County Comprehensive Plan: Franconia-Springfield Area

The Fairfax County Comprehensive Plan was initiated by the Fairfax County Planning Department in 2013 to guide decision making about the built and natural environment of Franconia-Springfield (Fairfax County 2013). The plan is based on three overarching principles: connectivity, revitalization, and implementation. These principles are intended to work together to transform Franconia-Springfield into a mixed use, easily accessible, and interconnected place. Residents, employees, and visitors will have their essential needs and services proximate to one another and easily accessible by multiple means of transportation, particularly by walking and biking.

To complete this vision, the Comprehensive Plan developed guiding principles to foster the revitalization and reinvestment of the area. These principles include:

- enhancing multi-modal linkages throughout the area;
- maintaining easy access to regional transportation systems;
- creating a usable wayfinding system;
- identifying and minimizing pedestrian vehicular conflicts by separating pedestrians from vehicular traffic;

- improving traffic circulation;
- developing the pedestrian realm; and
- encouraging even traffic flows through enhancements to the public transit system, incentives for carpooling, and implementation of a coordinated program of transportation demand management strategies.

In addition to the above stated visions for the Franconia-Springfield Area, the following transportation policy recommendations have also been developed to set the framework and guide future development of the area.

- **Complete Streets** – The right-of-way should be designed and operated to enable safe travel by all users and all transportation modes. This approach is recommended to be applied to the redesign and improvement of arterial roadways in the study area.
- **Level-of-Service E** – In order to achieve the multi-modal connectivity goals set forth, while maintaining a balance between vehicular and pedestrian/non-motorized movement in the area, a level-of-service (LOS) E standard is recommended to be applied in accessing transportation system adequacy. LOS E standard allows more congestion with greater amounts of delay than the general countywide standard of LOS D.
- **Public Transportation/Mode Split Performance** – Assumption that at least 10 percent of trips generated by development in the Franconia-Springfield area will be arriving and departing by public transportation. In areas within 0.5 mile walking distance from the platform, transit mode shares in excess of 10 percent would be expected.
- **Funding of Transportation Improvements** – The private sector (i.e., developers of the Alternative site) will need to contribute a substantial and equitable share to transportation improvements and/or funds required to meet the transportation needs of the area, similar to other county activity centers such as Tysons and the Fairfax Center Area.

The Comprehensive Plan also includes a recommended streets and circulation plan for the Franconia-Springfield Area that addresses three basic types of travel: (1) through traffic, (2) local traffic and circulation, and (3) property access. The following streets and circulation recommendations were developed to guide the future development of the area:

- **New Street Typologies with context-sensitive design** – A typology of streets and proposed street cross-sections is recommended in the Franconia-Springfield Area Urban Design and Streetscape Guidance, appended to the comprehensive plan and based on the roadway typology recommendations included in the Springfield Connectivity Study noted below.
- **Main Street Improvements** – Transportation recommendations for the Franconia-Springfield area include a number of major street improvements that would add capacity and enhance accessibility to the area. These recommended improvements include the following:

  (1) widen the Franconia-Springfield Parkway to eight lanes to include high occupancy vehicle (HOV) lanes between the Fairfax County Parkway (west of I-95) and Frontier Drive;

  (2) Backlick Road Bridge and one-way paired streets;

  (3) reconstruct Backlick Road as six lanes between Calamo Street and Franconia-Springfield Parkway;

(4) improve Bland Street to a four-lane facility in combination with intersection improvements;

(5) Springfield Boulevard four-lane improvement;

(6) Loisdale Road improvements including accommodating new access and site improvements adjacent to the Springfield Town Center redevelopment, and improving Loisdale Road to a four lane section between Spring Mall Drive and Springfield Center Drive to accommodate area redevelopment, and;

(7) Frontier Drive extended south to interconnect with the GSA warehouse area roadway network and provide a terminus at Loisdale Road.

- **Collector and Local Street Improvements** – Develop interconnected local and connector streets to facilitate circulation within individual developments and provide access within developments and throughout the planning area. Follow the new street typologies and other plans provided in the Comprehensive Plan.

- **Pedestrian and Bicycle Circulation** – Including the following specific recommendations:

  (1) develop a pedestrian circulation system;

  (2) improve the pedestrian and bicycle connection between the Franconia-Springfield Metro Station (Metro/Virginia Railway Express (VRE) station) and Springfield Mall (future town center);

  (3) improve the pedestrian and bicycle connection across I-95;

  (4) integrate safe pedestrian crossings into the design and redesign of streets and intersections;

  (5) provide mid-block pedestrian crossings where appropriate; and

  (6) create a system of bicycle lanes and facilities.

- **Public Transportation Improvements** – transit and HOV use improvements including:

  (1) improving access to the Franconia-Springfield Metro Station, including providing a direct pedestrian connection between the station and the GSA warehouse as an important element of the Frontier Drive Extension improvement;

  (2) enhancing bus circulator;

  (3) creating transit shuttles;

  (4) developing of a commuter parking facility and multi-modal center; and

  (5) implementing transportation demand management strategies.

2.4.5 Fairfax County Parkway/I-95 and Fairfax Parkway/Rolling Road

The Environmental Assessment for the Fairfax County Parkway Interchange Improvements was initiated by the Virginia Department of Transportation (VDOT) in cooperation with the Federal Highway Administration (FHWA) to study improvements to two existing interchanges on the Fairfax County Parkway (VDOT 2012a). The first involves constructing a new flyover ramp at the I-95 interchange for northbound I-95 traffic to access westbound Fairfax County Parkway, south of the Alternative site. The second involves widening the road to two lanes at the existing

single-lane loop ramp in the northeast quadrant of the Rolling Road/Franconia-Springfield Parkway/Fairfax County Parkway interchange, west of the Alternative site and outside of the transportation study area for this project.

2.4.6 Loisdale Road Corridor Transportation Study

The Loisdale Road Corridor Transportation Study was initiated by the Fairfax County Department of Transportation (FCDOT) in 2009 to consider additional development in the portion of a land unit in the I-95 corridor industrial area, west of the CSX railroad tracks between Loisdale Park and Newington Road (Fairfax County 2009). The study was asked to consider the impacts of a campus-style office complex and private recreation use to replace a portion of the industrial-zoned land in the corridor. The County staff developed a number of scenarios to examine the impacts of existing and future development on Loisdale Road, including existing development traffic, comprehensive plan build out, comprehensive plan build out plus area plan review (APR) nominations, and comprehensive plan build out plus APR nominations on the site.

Loisdale Road is a minor arterial roadway running east of and parallel to I-95 in the Springfield area of Fairfax County. At its northern end, Loisdale Road leads into Commerce Street at the intersection with Franconia Road, which is in proximity to the ramp entrances to northbound and southbound I-95. At its southern end, Loisdale Road connects Newington Road near its intersection with the Fairfax County Parkway and I-95 (Newington) interchange ramps. With the advent of Base Realignment and Closure (BRAC), up to 18,000 new military jobs are planned to be relocated to the I-95 corridor in Northern Virginia.

Based on the analysis of existing and planned future development in the Loisdale Road corridor, there will be a need to widen Loisdale Road to provide sufficient peak period capacity to accommodate projected future traffic loads. There are already sections of Loisdale Road and Spring Mall Drive that are at or approaching a failing traffic condition (as measured by volume-to-capacity [v/c] ratios). This is most evident in the PM peak hour, when traffic uses Loisdale Road to exit the Springfield commercial area. The comprehensive plan for the area indicated that Loisdale Road would need to be widened by at least one lane in each direction to accommodate peak period traffic from redevelopment of the GSA warehouse and surrounding properties to acceptable service levels.

2.4.7 Urban Land Institute Springfield Study

The Urban Land Institute (ULI) study of Springfield, Virginia, was initiated by the Fairfax County Department of Planning and Zoning in conjunction with the Department of Housing and Community Development. ULI completed the study in 2006 to help identify redevelopment opportunities and identify and address transportation issues for the Springfield area (ULI 2006). The panel's recommendations consist of a series of physical, organizational, and administrative actions to implement a vision for Springfield. The purpose of this ULI report was to initiate a rebirth of Springfield, with an emphasis on creating a vibrant, economically viable place with a mix of uses and public plazas where people may enjoy living, shopping, working, and recreating.

The ULI panel concluded the study with a series of key recommendations regarding transportation, including the following improvements:

- create a hierarchy of streets to serve both local and regional trips, using all modes of travel;
- increase continuity and connectivity of local streets;
- maximize opportunities for HOV and non-auto use;
- provide signage to improve wayfinding and local identity;

- focus on appropriate services for identified transit markets; and
- improve appearance of transportation facilities (roads and transit);

Furthermore, the study emphasized the importance of Metrorail and VRE services for residents heading out of, and for employees heading into, Springfield. The plan also designated that pedestrian walks linking nearby development with transit stations should be ample, convenient, and safe.

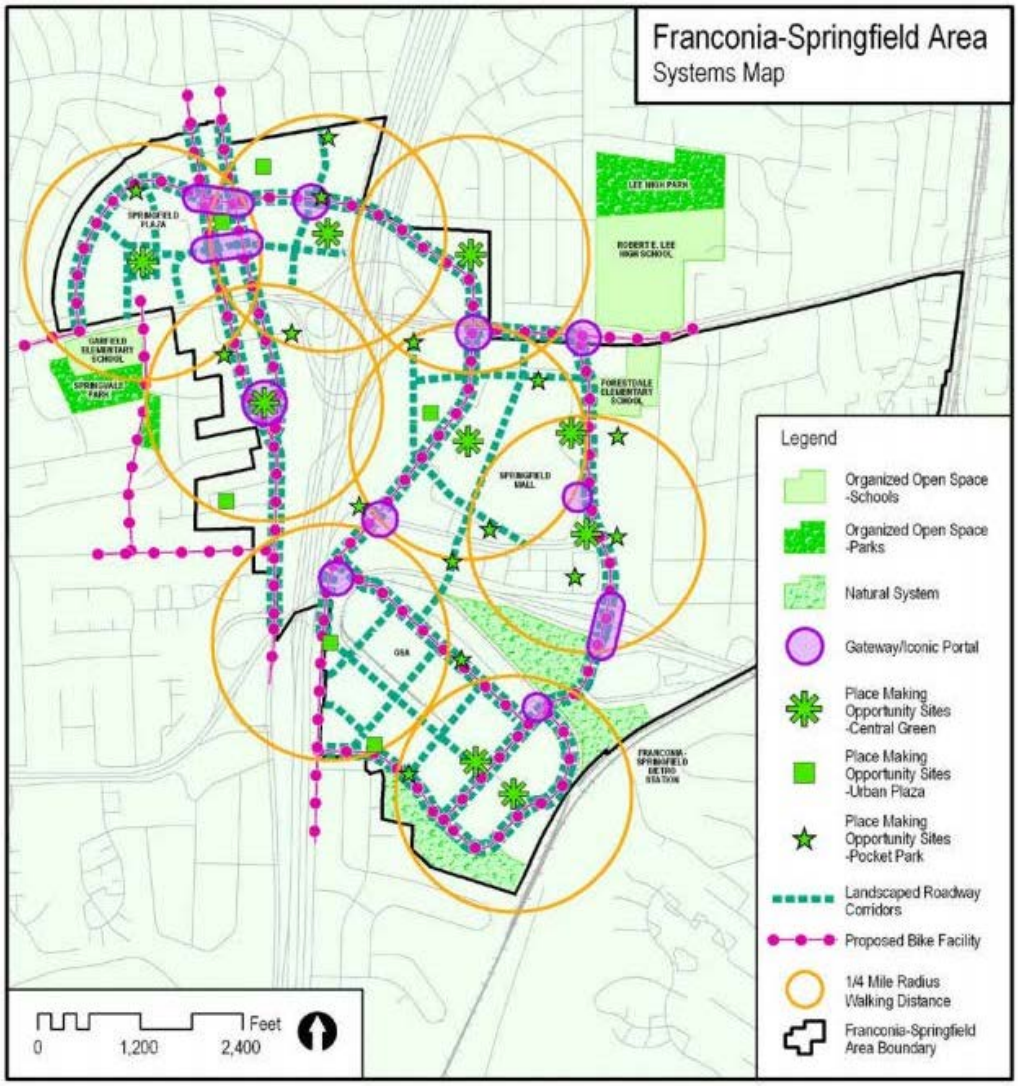
With regards to the GSA site in particular, the ULI study noted the current difficulty in accessing the facility from the Metrorail/VRE station from a security and environmental perspective because the GSA site is a secured facility and is separated from the station by the Long Branch Creek. The study also recommended prioritizing high-quality vehicular (auto/shuttle bus), pedestrian, and bicycle connections to the GSA site and the Metrorail station. This connection could be provided by extending Frontier Drive south to the Loop Road, an improvement that is currently slated for the future.

2.4.8 Springfield Connectivity Study

The Springfield Connectivity Study was initiated by Fairfax County, Virginia to address several challenges and opportunities facing the Springfield Area in 2006 (Cambridge Systematics Inc. et al. 2008). The study was processed in three stages: existing conditions compilation, land use and transportation evaluation, and preferred alternative selection. The preferred alternative had the most balanced and extensive mix of proposed land use and density for the area. A final set of framework plans and streetscape guidance were developed to support the preferred alternative. In all, three reports were produced from this analysis: Existing Conditions and Plans, Transportation and Land Use Evaluation, and Framework Plans and Street Typology.

The preferred alternative contains several transportation infrastructure enhancements in the Springfield area. First, it emphasizes additional connectivity through the introduction of a more grid-like pattern of streets. The resulting road network would be 25 percent more dense than under the 2030 Comprehensive Plan scenario, indicating improved capacity and connectivity. Second, three major projects are contemplated: (1) grade separation of Backlick Road and Old Keene Mill Road to enable Amherst Avenue and Backlick Road to function as a pair of one-way streets; (2) construct an up-to 1,000-space parking garage on the Circuit City site near the Springfield Mall; and (3) extend Frontier Drive to the GSA property and, potentially, beyond. Third, non-motorized modes would receive added attention, including a new transit circulator as well as shuttle services proposed to further promote transit usage within the study area. Equally as important, many new bicycle lanes and sidewalk connections throughout the study area are planned as well as uniform signage, usable urban parks, civic plazas, attractive architecture, and other amenities as shown in figure 2-2 from the Springfield Connectivity Study report.

Figure 2-2: Franconia-Springfield Area Systems Map



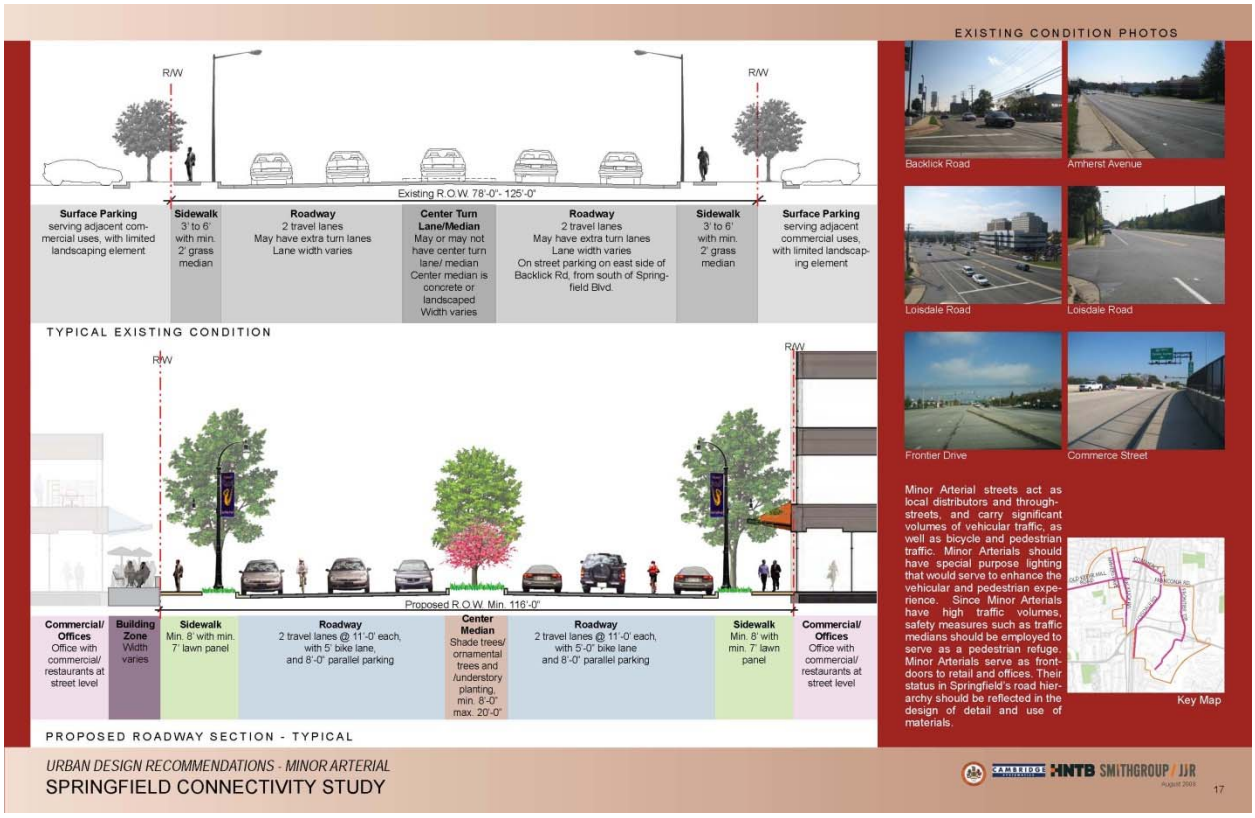
*Specific road alignments and Placemaking Opportunity Sites in this conceptual illustration will be determined during rezoning and are not intended to affect by-right development.

Source: Fairfax County (2013)

A typology of streets was also developed to create a pattern of context-sensitive road designs for Springfield. Proposed roadway cross sections were created to establish a framework to improve roads and facilitate active streetscapes. Recommendations aim to strengthen the sense of place in Springfield by reinforcing the existing urban infrastructure and enhancing multi-modal opportunities. Minor arterials, such as Loisdale Road, Franconia Road, Frontier Drive, and Commerce Street, are envisioned to typically have two travel lanes, one 5-foot wide bike lane, and parallel parking in each direction; a center median between 8- and 20-feet wide; and sidewalk areas composed of a minimum 8-foot sidewalk and a 7-foot lawn panel (figure 2-3). Collector streets, such as Spring Mall Drive, Springfield Center Drive, and Metropolitan Center Drive, are typically proposed to have two travel lanes in each direction, with a wider outside lane to accommodate bike traffic, parallel parking on both sides of travel lanes in many cases, and sidewalk areas with a minimum 8-foot sidewalk and a 7-foot lawn panel. Local streets, such as those within the GSA Springfield parcel and within the Springfield Mall superblock, are typically proposed to have a two-way street with one travel lane and one parallel parking lane in each direction. These

streets would usually have sidewalks, and planting areas would have trees with a minimum 12-foot-wide canopy in residential areas, and a minimum 20-foot-wide canopy in commercial areas.

Figure 2-3: Springfield Connectivity Study – Proposed Minor Arterial Roadway Section, Typical



Source: Cambridge Systematics, Inc. et al. (2008)

2.4.9 Fairfax County Parkway Corridor Improvement Study

VDOT, in cooperation with Fairfax County, is conducting a multimodal corridor study for the Fairfax County Parkway from State Route 7 (Leesburg Pike) to U.S. Route 1 (Richmond Highway). The study corridor is approximately 31 miles in length and consists of 83 intersections and 17 interchanges. The study will evaluate existing and short-term traffic conditions and will develop multi-modal recommendations to address existing and projected operational issues along the corridor. This project will assess short-term multimodal improvements that can be implemented immediately or within the next five to ten years to address operational and safety issues (VDOT 2015a). Fairfax County Parkway provides direct access to I-95 and connects to Loisdale Road, the primary road serving the existing GSA warehouse. The study is expected to be completed by Fall 2016.

2.4.10 Franconia Springfield Station Vision Plan

The Franconia Springfield Station Vision Plan was initiated by WMATA to identify station improvements and joint development potential at the Franconia Springfield Metro Station in Fairfax County, Virginia (WMATA 2008a). The Station Vision Plan is a result of collaboration among WMATA, Fairfax County, and local stakeholders to address overall goals for improved accessibility to and from the station, improved station functionality and transit operations, and future joint development that achieves the highest and best use of WMATA's property and meets stakeholder goals.

In the long term, WMATA's 60-acre property is proposed for large-scale redevelopment. This vision includes:

- Redevelopment of the parking garage into a mixed use transit-oriented development that also houses transit functions such as bus bays and a taxi stand. The development is located in separate blocks that would be oriented towards the transit station, including 430,000 SF of office, 36,000 SF of retail, and 660 residential units in buildings ranging from 2 through16 stories tall.
- Two new roads running north-south through the site that would create a grid-like system of streets.
- A wetland park featuring native Virginian vegetation.
- A central transit plaza that would create a new sense of entry for the Metrorail station.

2.5 Regulatory Requirement and Transportation Assumption Agreement

2.5.1 National Capital Planning Commission Requirements

There a number of other assumptions that are considered in transportation analysis including those determined by regulatory requirement. An example of one assumption of this nature is the parking ratios developed for each alternative site as stated in the Federal Elements section of the Comprehensive Plan for the National Capital (NCPC 2004). In response to regional congestion and air quality levels, NCPC has recommended that parking be provided only for those federal employees who are unable to use other travel modes. To accomplish this policy, NCPC has created parking ratio goals for federal facilities based on their location to available transit services, walking distances and conditions in the surrounding area, and other criteria. Parking ratios are the number of parking spaces available per employee population. Suburban facilities within 2,000 feet of Metrorail should have one parking space for every three employees (1:3) according to NCPC; therefore, the amount of parking at the Springfield site has been determined based on this requirement.

2.5.2 Jurisdictional Agreement

Prior to initiating the transportation analysis, it was essential to determine what analysis tools, data parameters, and assumptions would provide the basis of the analysis. In coordination with GSA, the project team met with VDOT and FCDOT to come to an agreement on the assumptions to follow for each site.

VDOT, through its scoping process (VDOT 2012b), requires that a scoping form be approved prior to analysis outlining the agreed upon level of detail, the data parameters, and type of analysis. These parameters and assumptions include a study area, trip generation, trip distribution, modal split, analysis years, analysis methods, and No-action/No-build transportation assumptions (background growth, planned developments, and planned roadway improvements).

Because access to the site was available by Interstate, the site agreements included guidance to analyze the Interstate facilities. This include which software to use, the specific facilities to study, the time period and EIS Condition, and pass/fail analysis threshold.

Appendix E1 contains the Springfield Site Transportation Agreement.

3.0 Existing Conditions: Springfield Study Area

This chapter introduces the study area for the Springfield site in Fairfax County, Virginia. The chapter provides a summary of the existing transportation conditions within the study area as of March 2015. Data were collected between November 2014 and March 2015 with traffic counts obtained as early as March 2014 include descriptions of the study area, pedestrian network, bicycle network, public transit system, parking conditions, truck access, traffic operations, and crash analysis. Separate TIA documents have been written for the other two alternative sites (Landover and Greenbelt) and the JEH parcel in Washington, D.C.

3.1 Introduction

This section describes the transportation study area and the roadways serving it, followed by a summary of the data collection process.

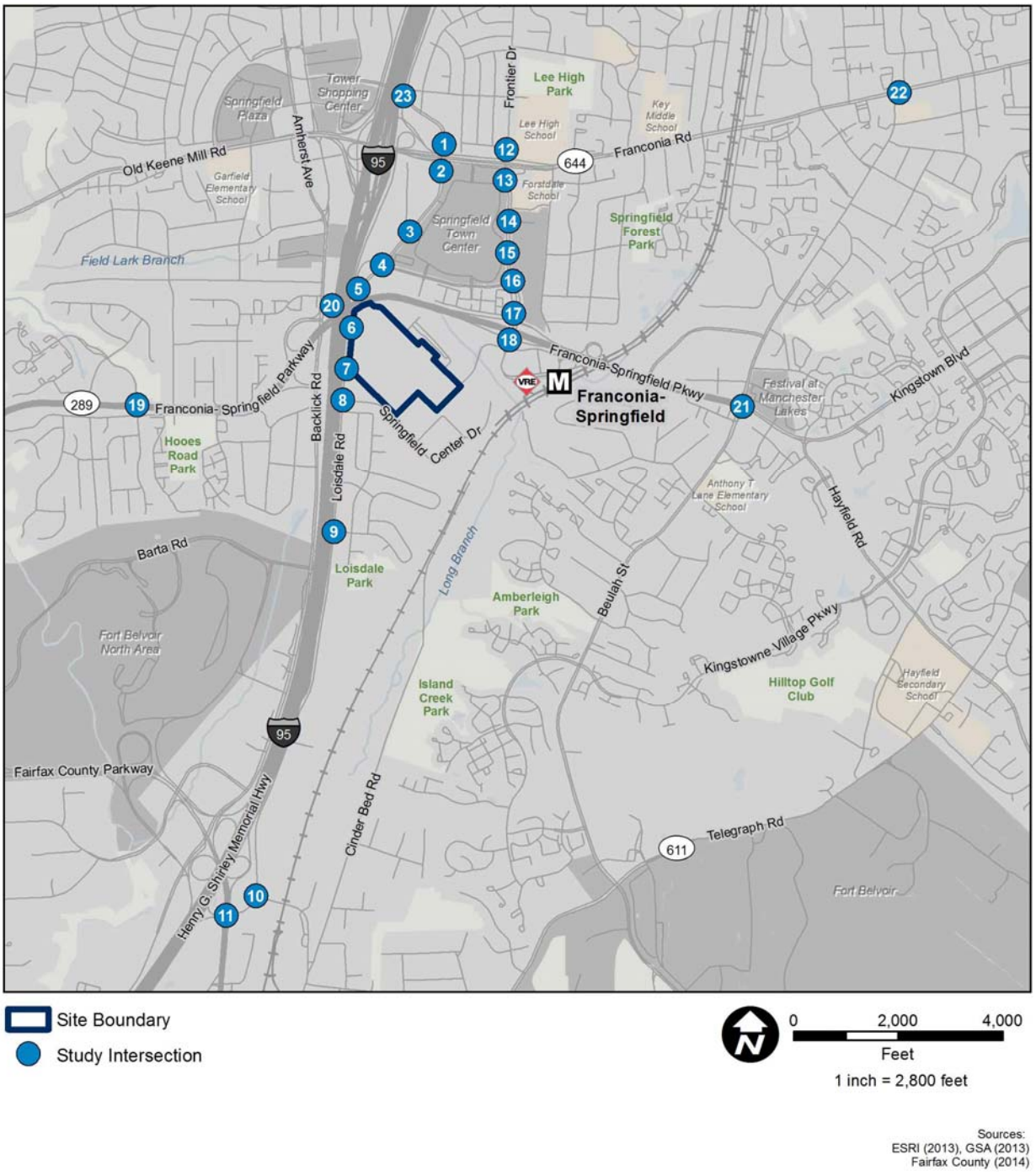
3.1.1 Study Area Description

The Springfield site is located on approximately 60 acres of land south of Franconia-Springfield Parkway, east of I-95, and west of the CSX railroad right-of-way (figure 3-1). The site is owned by GSA and divided into two sections: (1) Building A and sprinkler house, the “GSA Side;” and (2) Buildings B, C, D, and 1 through 12, the LOC (GSA 2015a). GSA provides several different government agencies space in Building A for storing, shipping, and receiving dry goods, primarily consisting of office supplies, furniture, and electronics. The LOC operates in a similar fashion as Building A. There is a small vehicle fueling center used by the LOC adjacent to Building B.

The larger vehicular transportation study area (figure 3-1), extends from just east of I-95 to the west, to just north of Franconia Road to the north, Beulah Street to the east, and Fairfax County Parkway to the south. The vehicular study area incorporates all of the intersections agreed upon for detailed study by GSA and the local and state transportation agencies, as well as the adjacent merge/diverge/weaves along I-95 for the existing ramps that would serve the proposed FBI vehicle trips. The vehicular traffic study area includes intersections between the proposed sites and regional highway network or last major decision point before entering a freeway facility. The determination of intersections to include for detailed study further considered the intersections along roadways reasonably anticipated to carry a substantial portion of employee vehicle traffic percent based on trip generation data. The study area only includes the selected intersections, but it does not have a clearly defined study boundary; it was established in consultation with FCDOT and VDOT and includes a total of 23 intersections for the Existing Condition analysis.

The study area analyzed for the other transportation modes generally includes all areas within a 0.5-mile buffer of the site. A 0.5-mile radius was chosen in consultation with the Washington Metropolitan Area Transit Authority (WMATA) and is an industry standard for analyzing those pedestrian trips which are comfortably accessible to transit, and is commonly used as a typical walk-shed. To be consistent among non-vehicular traffic modes, the bicycle and parking impacts were also evaluated within a 0.5-mile radius from the site.

Figure 3-1: Springfield Transportation Study Area



3.1.2 Project Area Accessibility and Roadway Functional Classification

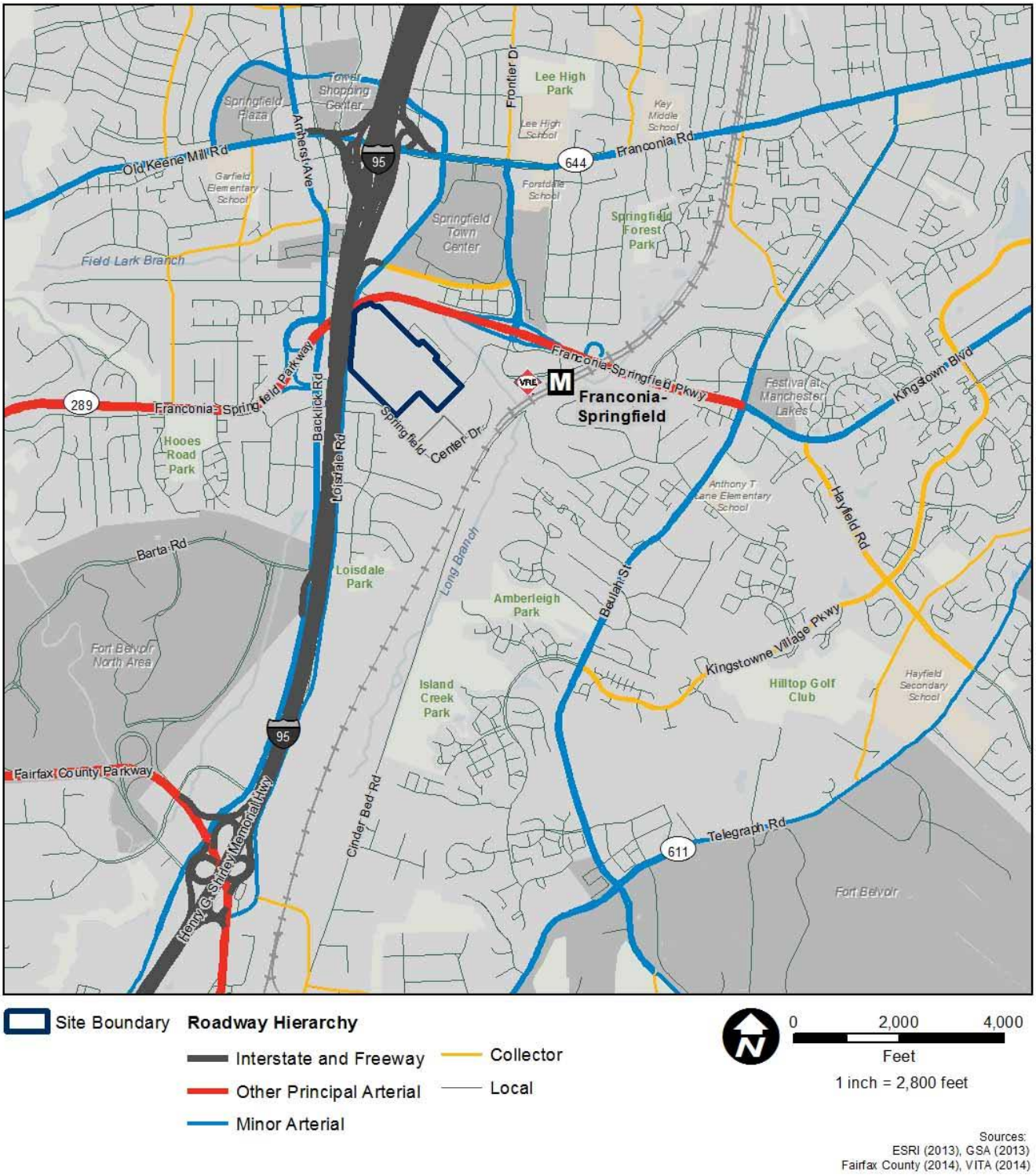
The Springfield site is currently accessible via two access points from Loisdale Road on the western side of the site (Intersections #6 and #7). Loisdale Road connects with Franconia Road to the north and Fairfax County Parkway to the south, both of which are east-west arterial roads. Franconia Road and Fairfax County Parkway provide the closest access points to the north-south oriented I-95; however, northbound I-95 traffic destined for the Springfield site can also exit via Exit 169A which exits as Loisdale Road, just north of the site. I-95, just west

of the site, provides regional north-south connections and becomes I-395 about 1 mile north of the site, providing direct access to Arlington, Virginia, and Washington, D.C. Also about 1 mile north of the site, I-95 intersects with the Capital Beltway (I-495), a circumferential highway around Washington, D.C., providing access to Northern Virginia and Montgomery and Prince George's Counties in Maryland. Franconia-Springfield Parkway also abuts the Springfield site to the northwest, but this roadway is not directly accessible from Loisdale Road where vehicles exit the site. Access to Franconia-Springfield Parkway from the site is via Metropolitan Center Drive or Spring Mall Road and then Frontier Drive.

The Springfield site is served by transit including Metrorail, commuter rail, and local and intercity buses, as well as carsharing services. The site has sidewalks along its western and northern edges (Loisdale Road and Metropolitan Center Drive). Most of the roadways in the study area have sidewalks on at least one side of the street except for Springfield Center Drive south of the site, Franconia-Springfield Parkway as it travels over I-95 (although there is a pedestrian bridge and sidewalks that make this connection south of the Franconia-Springfield Parkway overpass), and various residential neighborhoods in the 0.5-mile non-vehicular study area. There are no bikeshare stations or bicycle lanes in the vicinity of the study area, but there are several mixed-use paths along Franconia-Springfield Parkway and portions of Loisdale Road and Frontier Drive.

A map of roadway functional classifications within the project area according to the geographic information systems (GIS) data collected from various local and state governments is shown in figure 3-2 (VGIN 2013). Functional classification is the process by which public streets and highways are grouped into classes according to the character of service they are intended to provide. Interstates, freeways, and expressways provide the highest level of service at the greatest speed for the longest uninterrupted distance, followed by principal arterials, minor arterials, collector roads, and local roads. The primary interstate within the study area providing regional access is I-95 just west of the Springfield site. Further north and outside of the study area, I-395 and I-495 are two additional interstates that provide regional access. South of the site, Fairfax County Parkway provides regional east-west connectivity and north of the site, Franconia-Springfield Parkway (Virginia State Route 289) also provides east-west connectivity. Both roadways are classified by the VDOT as other principal arterial. Other study area roadways classified as minor arterials include: Frontier Drive, Franconia Road/Old Keene Mill Road (Virginia State Route 644 Commerce Street, Amherst Avenue, Backlick Road, Loisdale Road, Beulah Street, and Telegraph Road (Virginia State Route 611). Collector roads provide the next roadway classification and Spring Mall Drive is the only collector road serving the study area. The other study area roadways, including, Metropolitan Center Drive, Springfield Center Drive, and other smaller roadways, are classified by VDOT as local roadways.

Figure 3-2: Roadway Hierarchy and Classification



3.1.3 Roadway Descriptions

The following section describes the primary roadways within the study area, including the VDOT roadway classifications (arterials, collectors, local roads, etc.) assigned by VDOT, according to the Virginia Geographic Information Network (VGIN) road centerline GIS data (VGIN 2013). This section also discusses the number of lanes in each direction, the latest average annual daily traffic (AADT) volumes (12-months of traffic volumes averaged) available from VDOT (2013a and 2013b), and any noteworthy characteristics such as a roadway's role within the transportation network. The information was collected from the VGIN GIS data, VDOT, observations in the field, and aerial imagery from Google maps (https://maps.google.com).

Henry G. Shirley Memorial Highway, more commonly known as I-95, is a north-south oriented interstate that traverses just west of the Springfield site and provides regional access as well as access along the east coast of the United States from Maine to Florida. Travelling south and north, the roadway generally consists of four lanes and additional right-merging access lane(s) in each direction. In between the northbound and southbound lanes are two reversible lanes dedicated to High Occupancy Toll (HOT) lanes that travel northbound in the morning and southbound in the evening. The center HOT lanes are available for use by any vehicular user who opts to pay and available for free to users who have three or more passengers in their vehicle, transit vehicles, or motorcycles. The roadway connects to Old Keene Mill Road, Franconia Road, and Loisdale Road, and Spring Mall Drive (northbound exiting traffic only) north of the site. South of the site, I-95 connects to Franconia-Springfield Parkway and via access ramps to Loisdale Road, Backlick Road, Boudinot Drive, and Heller Road. The central HOT lanes of I-95 also connect to Franconia-Springfield Parkway, but the regular travel lanes of I-95 do not. Travelling on the regular lanes, the speed limit is 55 miles per hour (mph), while the speed limit is 65 mph in the HOT lanes. In 2013, the AADT for I-95 traversing through the study area was 110,000 vehicles (VDOT 2013a).

Franconia-Springfield Parkway, also known as Virginia State Route 289, travels east to west and is classified as other principal arterial road by VDOT (VGIN 2013). The road traverses north of the Springfield site connecting I-95 with Kingstowne Center on the east and Fairfax County Parkway on the west via a three-lane roadway in each direction with a protected median. The speed limit is 50 mph. In 2013, the AADT for the Franconia-Springfield Parkway was 45,000 vehicles (VDOT 2013a).

Franconia Road, also known as Virginia State Route 644, travels north of the study area with an east-west orientation and provides local access as well as access to many residential neighborhoods north and south of the roadway. According to VDOT, the roadway is classified as a minor arterial road (VGIN 2013). East of Frontier Drive, Franconia Road has three travel lanes at-grade in each direction; on the west side of Frontier Drive east of I-95, Franconia Road is an elevated roadway with two travel lanes in each direction. The roadway has a protected median throughout, several left turn lanes, and is flanked by two subsidiary connecting at-grade roadways between I-95 and Elder Avenue (just east of Frontier Drive). These parallel at-grade roadways are called Franconia Road East (to the south) and Franconia Road West (to the north) and they have two or three travel lanes in each direction. Franconia Road, or the at-grade Franconia Road East or West, connects to Loisdale Road, I-95, Frontier Drive, Commerce Street, and Backlick Road. The speed limit is 40 mph west of Frontier Drive and 35 mph east of Frontier Drive. West of I-95, Franconia Road becomes Old Keene Mill Road. The estimated AADT in 2013 for Franconia Road between I-95 and Loisdale Road was 58,000 vehicles, and east of Loisdale Road the estimated 2013 AADT was 36,000 vehicles (VDOT 2013b).

Old Keene Mill Road, also known as Virginia State Route 644, begins just west of I-95 and has an east-west orientation. According to VDOT, the roadway is classified as a minor arterial road (VGIN 2013). With a protected median throughout, the roadway changes between three to four lanes in each direction with periodic left-turn lanes (Cambridge Systematics, Inc. et al. 2008). The roadway connects to Backlick Road, I-95, and Commerce Street. The speed limit is 45 mph. East of I-95, Old Keene Mill Road becomes Franconia Road. The estimated

AADT in 2013 for Old Keene Mill Road west of Backlick Road was 46,000 vehicles, and between Backlick Road and I-95, the estimated 2013 AADT was 74,000 vehicles (VDOT 2013b).

Commerce Street traverses I-95 with an east-west orientation, forming a curvilinear connection from Old Keene Mill Road east of I-95 to Franconia Road west of I-95, where it eventually forms a north-south orientation and becomes Loisdale Road south of Franconia Road. According to VDOT, the roadway is classified as a minor arterial road (VGIN 2013). East of I-95, the road maintains a two- to three-way roadway in each direction in addition to a protected median throughout. West of I-95, the road is composed of two lanes in each direction and the road centerline changes between a protected median, an unprotected median, and periodic left-turn lanes. The road connects to Old Keene Mill Road, Backlick Road, I-95, Franconia Road, and Loisdale Road. According to VDOT, Commerce Street is classified as a minor arterial road (VGIN 2013). The speed limit is 35 mph. The estimated AADT in 2013 for Commerce Street between Franconia Road and Backlick Road was 23,000 vehicles, and between Backlick Road and Old Keene Mill Road, the estimated 2013 AADT was 11,000 vehicles (VDOT 2013b).

Loisdale Road has a north-south orientation and traverses just west of the Springfield site. According to VDOT, the roadway is classified as a minor arterial road (VGIN 2013). North of Franconia-Springfield Parkway the roadway changes between two and three lanes in each direction with occasional extra left-turn lane(s) and a protected median throughout. South of Franconia-Springfield Parkway, there is one lane in each direction with a shared center turning lane and no median. Along this southern stretch there is an extra paved area on the eastern side of the road that does not allow parking north of Layton Drive, but in the residential area south of Layton Drive on-street parking is allowed. According to VDOT, the roadway is classified as a minor arterial road (VGIN 2013). To the north of the site, Loisdale Road connects to Franconia Road, Commerce Street, Loisdale Court and at the western Springfield Mall entrance, Spring Mall Drive, and Metropolitan Center Drive. South of the site, Loisdale Road connects to Springfield Center Drive and Lois Drive, and farther south connects to Fairfax County Parkway. The speed limit is 35 mph. The estimated AADT in 2013 for Loisdale Road north of Spring Mall Road was 21,000 vehicles (VDOT 2013b). Between Spring Mall Road and Newington Road, the estimated 2013 AADT was 9,600 vehicles, while the estimated AADT between Newington Road and Fairfax County Parkway was 15,000 vehicles.

Frontier Drive is a north-south oriented minor arterial roadway as classified by VDOT (VGIN 2013). South of Franconia Road, Frontier Drive generally has three travel lanes in each direction with additional left-turn lane(s) throughout. Extending from Franconia-Springfield Parkway to Franconia Road there is a narrow protected median. South of Franconia Road, Frontier Drive becomes the sole access roadway to the Franconia-Springfield Metro Station. At the intersection with Franconia Road to the north, Frontier Drive traverses underneath Franconia Road into a primarily residential area with one lane in each direction with no median. Frontier Drive connects to Franconia Road, Spring Mall Drive, Franconia-Springfield Parkway, and Joe Alexander Road (which turns west to become Metropolitan Center Drive). The speed limit is 35 mph. The estimated AADT in 2013 for Frontier Drive between Franconia Road and Spring Mall Road was 26,000 vehicles, and south of Spring Mall Road, the estimated 2013 AADT was 34,000 vehicles (VDOT 2013b).

Spring Mall Drive has an east-west orientation that extends from Loisdale Road to Frontier Drive north of the site. According to VDOT, the road is classified as a major collector roadway (VGIN 2013). Containing a protected median and periodic left-turn lanes, Spring Mall Drive serves the Springfield Mall to the north and several commercial properties and a multi-family residential neighborhood to the south. The roadway has two travel lanes in each direction, and the speed limit is 35 mph. The estimated AADT in 2013 for Spring Mall Drive was 17,000 vehicles (VDOT 2013b).

Springfield Center Drive forms a curvilinear shape around the south perimeter of the Springfield site. According to VDOT, the road is classified as a local road and connects to Loisdale Road on the west (VGIN 2013). The road-way has one wide lane in each direction with no median. The speed limit is 25 mph.

Metropolitan Center Drive has a northwest -southeast orientation that travels along the northeast perimeter of the Springfield site. According to the VDOT, this roadway is classified as a local roadway (VGIN 2013). Metropolitan Center Drive has a one-way travel lane in each direction with no median. The road connects to Loisdale Road on the west and turns at the eastern end of the residential development to become Joe Alexander Road, which then connects to Frontier Drive on the east, south of the intersection with Franconia-Springfield Parkway. The speed limit towards the residential section of Metropolitan Center Drive is 5 mph.

Backlick Road is located west of the site and I-95 and is north-south oriented. According to VDOT, the road is classified as a minor arterial road south of where it merges with Amherst Avenue and a local road north of that point (VGIN 2013). South of Commerce Street, Backlick Road primarily has two travel lanes in each direction with periodic left-turn lanes and a protected median south of Old Keene Mill Road. At Old Keene Mill Road, Backlick Road is split, preventing through north-south travel due to a continuous median on Franconia Road. Paralleling Backlick Road, Amherst Avenue crosses over Old Keene Mill Road and becomes a one-way southbound road when Backlick Road becomes a one-way northbound road north of Commerce Street. North of Commerce Street, Backlick Road becomes a one-way road with three travel lanes and one wide outside parking lane. Backlick Road connects to Commerce Street, Old Keene Mill Road, Amherst Avenue, Franconia-Springfield Parkway, and the Fairfax County Parkway south of the site. The speed limit is generally 30 mph; however, south of Franconia-Springfield Parkway the speed limit raises to 45 mph. The estimated AADT in 2013 for Backlick Road south of Franconia-Springfield Parkway was 25,000 vehicles; north of Franconia-Springfield Road to Franconia Road, the estimated 2013 AADT for Backlick Road was 42,000 vehicles (VDOT 2013b).

Amherst Avenue has a north-south orientation and is located west of the Springfield site. The roadway parallels Backlick Road north of Old Keene Mill Road and has two lanes in each direction, with periodic left-turn lanes, and a protected median. According to VDOT, Amherst Avenue is classified as a minor arterial road (VGIN 2013). The roadway connects to Commerce Street, Backlick Road, and Old Keene Mill Road. The speed limit is 30 mph. The estimated AADT in 2013 for Amherst Avenue south of Franconia Road was 28,000 vehicles; north of Franconia Road the estimated 2013 AADT for Amherst Avenue was 15,000 vehicles (VDOT 2013b).

Beulah Street is located east of the site, has a southwest-northeast orientation, and connects Telegraph Road to the south with Franconia Road to the north, via a connection with Franconia-Springfield Parkway. Within the study area, Beulah Street generally has two through lanes in each direction, left and right turn lanes at intersections, a protected median, and bike lanes in each direction. Beulah Street is classified as a minor arterial road by VDOT, and the speed limit is 35 mph (VGIN 2013). The estimated AADT in 2013 for Beulah Street north of Franconia-Springfield Parkway was 23,000 vehicles; south of Franconia Road the estimated 2013 AADT for Beulah Street was 15,000 vehicles (VDOT 2013b).

Fairfax County Parkway is located south of the site and has an overall northwest-southeast orientation connecting areas as far north as Reston and Herndon near Route 7 to the Newington and Fort Belvoir areas near its terminus at Route 1 in the south. According to VDOT, the roadway is classified as other principal arterial (VGIN 2013). West of I-95, the Fairfax County Parkway provides limited access primarily to other regional roadways via grade-separated interchanges, has a speed limit of 50 mph, has a protected median, and generally has three through lanes in each direction. East of I-95, Fairfax County Parkway generally provides access to multiple road classifications via at-grade intersections, has two through lanes in each direction, left and right turning lanes at intersections or access points, a protected median, and a speed limit of 40 mph. The estimated AADT in 2013 for this section of the Fairfax County Parkway was 28,000 vehicles (VDOT 2013b).

As part of the field data collected, a detailed inventory of the lane geometry was conducted through field reconnaissance and a study of aerial imagery. The existing lane geometry and traffic control type (signalized or unsignalized) are shown in figure 3-3.

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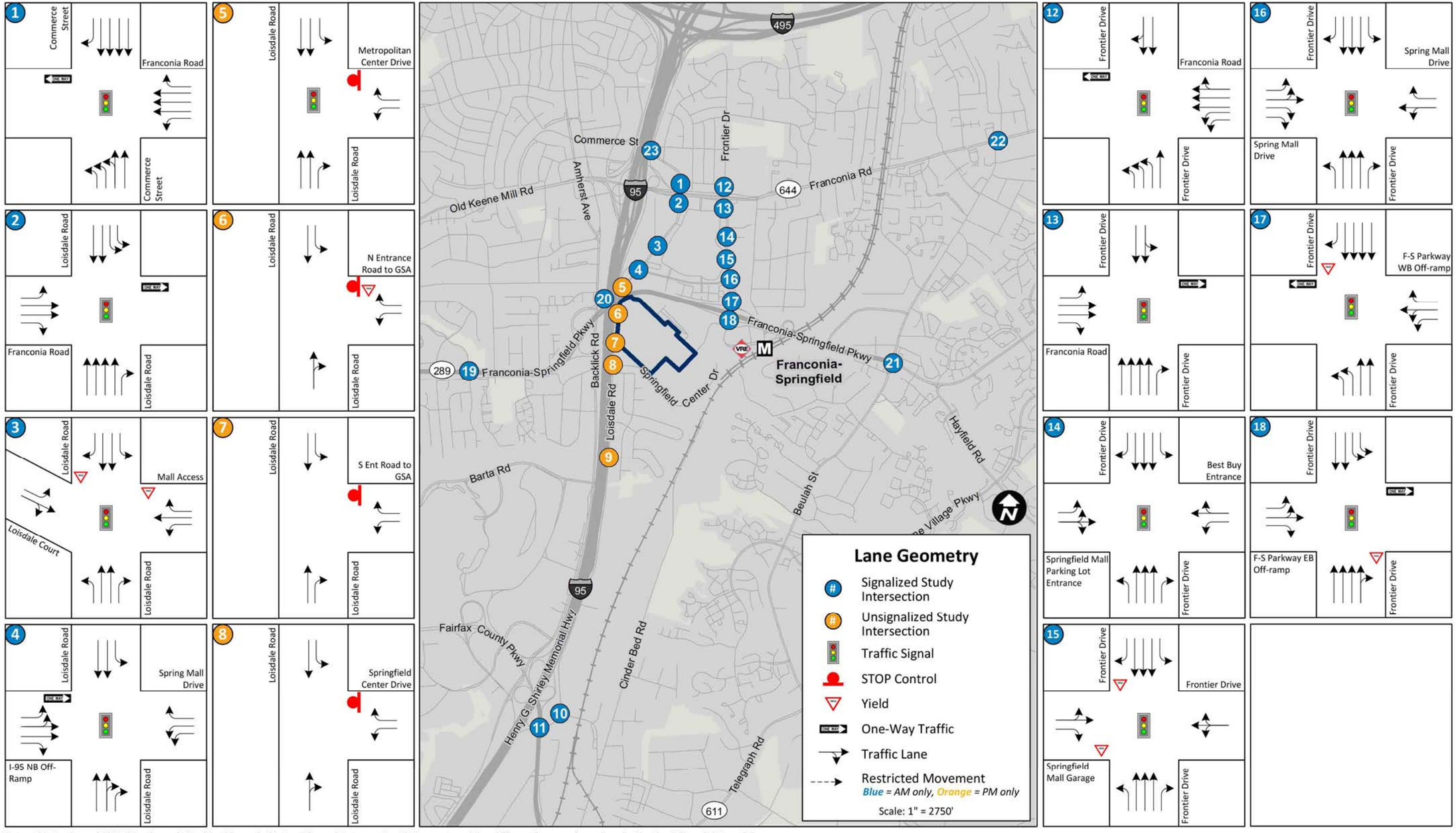
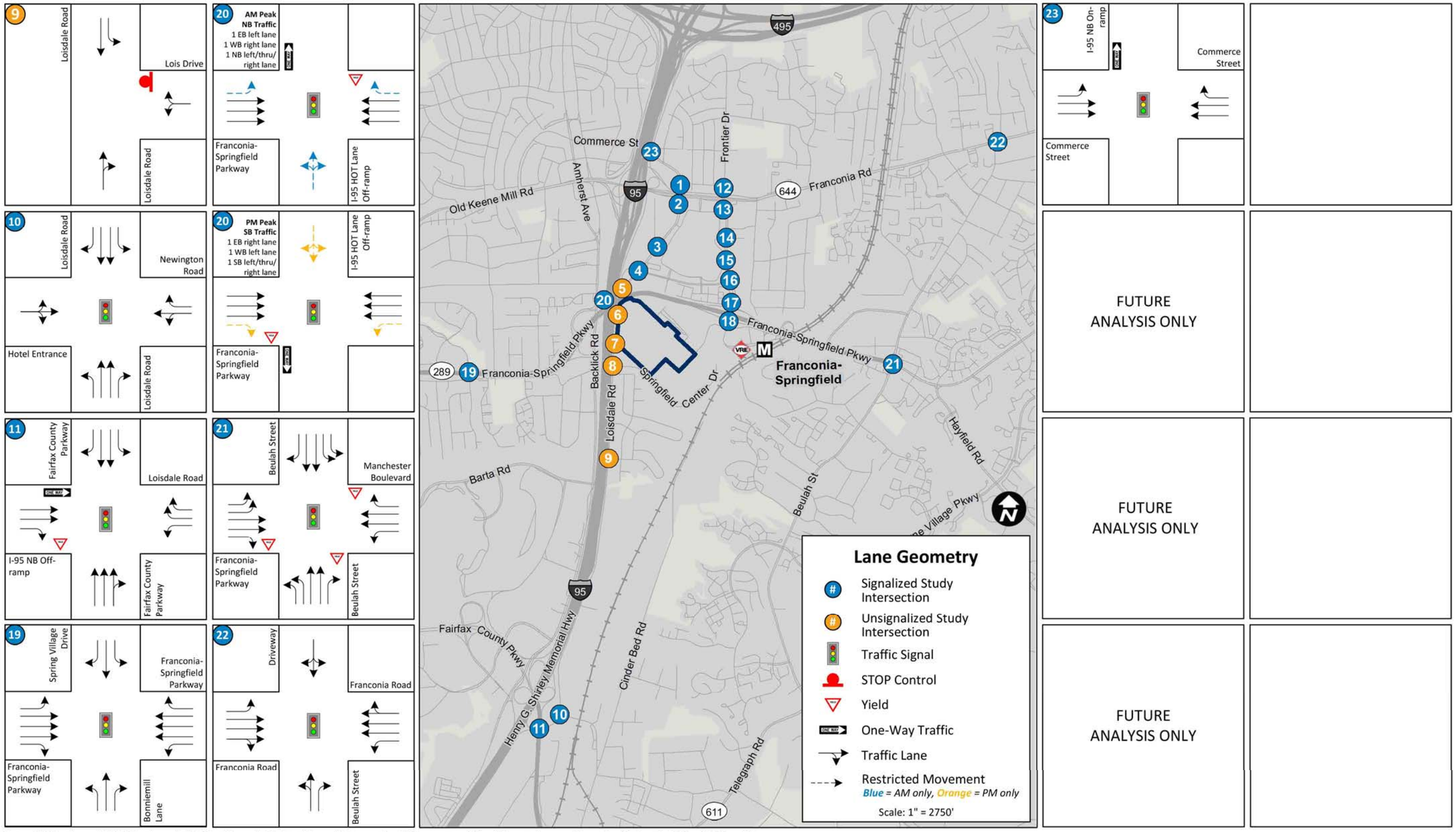
Figure 3-3: Existing Lane Geometry and Traffic Control Type



Note: EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound. Intersection #20 operates with a different lane configuration during the AM and PM peak hours.

Figure 3-3: Existing Lane Geometry and Traffic Control Type (continued)



Note: EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound. Intersection #20 operates with a different lane configuration during the AM and PM peak hours.

3.1.4 Data Collection

Intersections counts were collected in November 2014, December 2014, January 2015, and February 2015. The counts were obtained between the hours of 6:30 AM and 9:30 AM and 4:00 PM and 7:00 PM (Appendix E2). Intersection counts include vehicular, truck, bicycles, and pedestrian volumes. Automated Traffic Recorder (ATR) counts were collected for interchange ramps and other select roadway segments over at least a 24-hour weekday period in April 2014, January 2015, and February 2015. The traffic counts collected were used in combination with signal timing data from VDOT and observations in the study area.

After examining the collected count data for the study area, the peak AM and PM traffic hours were determined for both the arterial transportation system (intersection counts) and the interstate system (ATR counts). These peak hours are shown as yellow bars on figures 3-4 through 3-6. The determination of a peak hour relied on the arterial system peak hour because the arterial system would be most impacted by the addition of a consolidated FBI HQ facility. In addition, the Interstate system morning peak hour is within 15 minutes of the arterial system and afternoon flows remain near the peak through the arterial system peak hour. The overall weekday AM peak hour used for the analysis occurs between 7:30 AM and 8:30 AM, and the weekday PM peak hour occurs between 5:00 PM and 6:00 PM. The same peak hours were extracted from the AM and PM peak period intersection turning movement volumes and placed into a diagram (see figure 3-7). Volumes between intersections were compared to ensure volumes departing one intersection were no more than a 10 percent difference from the next downstream intersection, except if there were driveways between intersections serving retail (VDOT 2013c).

Figure 3-7 shows the existing AM and PM weekday peak hour turning movement volumes occurring in the study area. AM peak hour volumes range from about 12,400 vehicles-per-hour (vph) to about 14,200 vph, and PM peak hour volumes range from about 16,000 vph to about 16,500 vph. The range is greater in the AM, than the PM, which is normal. More people arrive at work staggered around the AM peak hour, while they leave work in a more spread fashion in the PM peak hour.

Figure 3-4: Springfield Intersection (Arterial) Cumulative AM Volumes

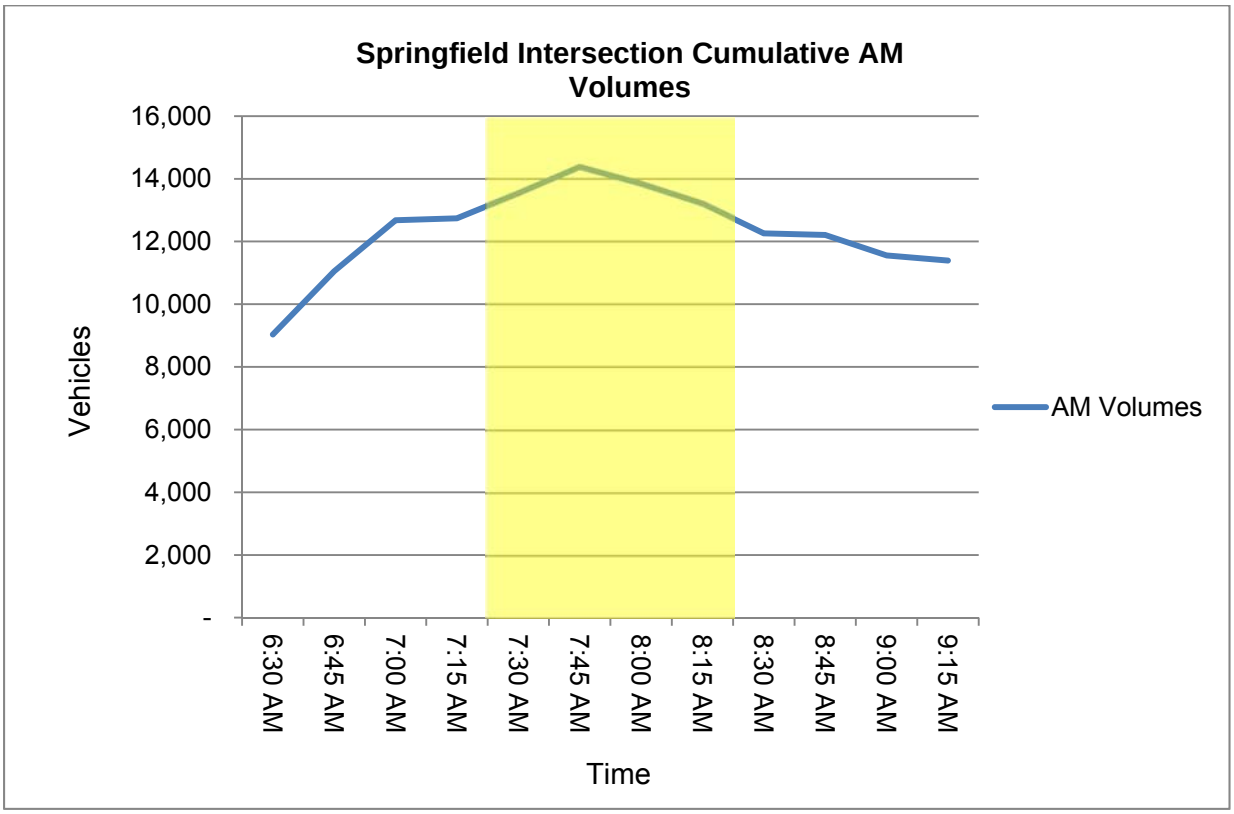


Figure 3-5: Springfield Intersection (Arterial) Cumulative PM Volumes

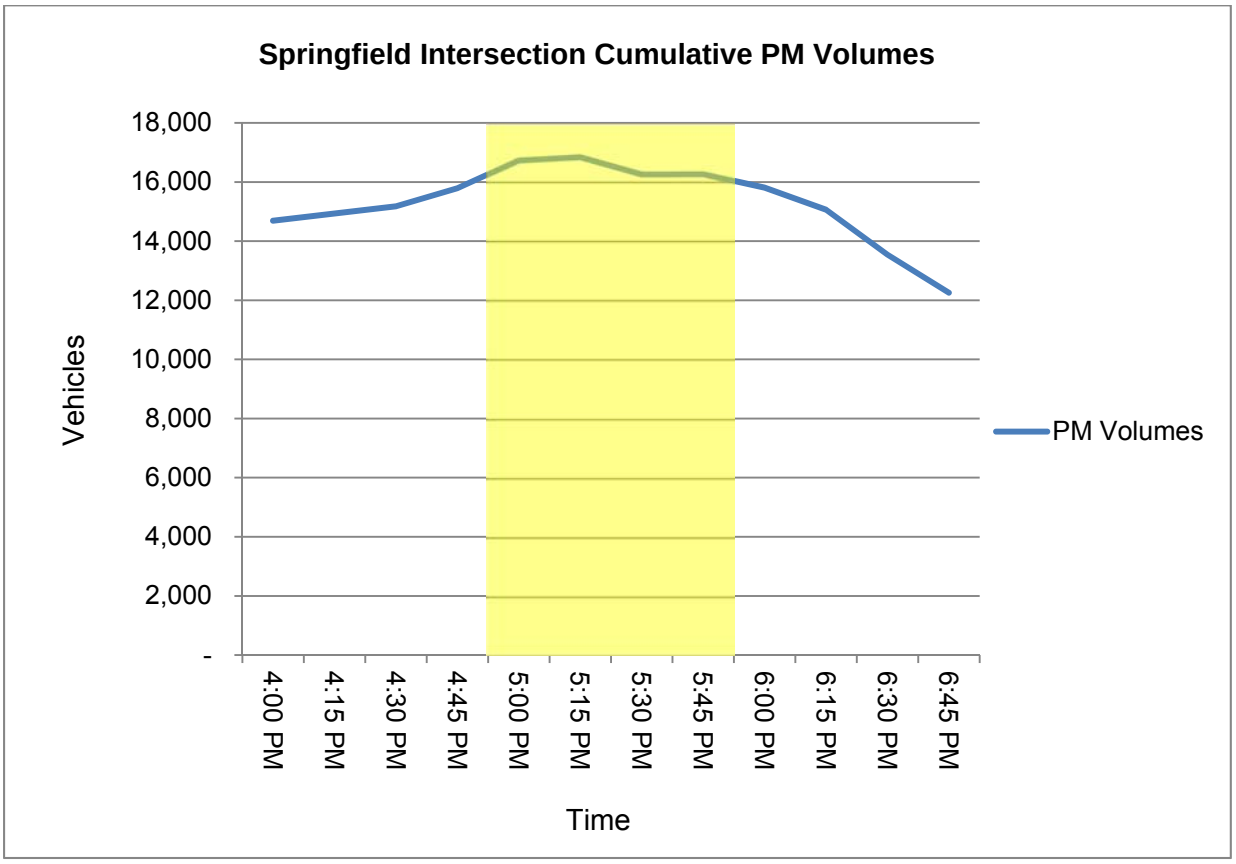


Figure 3-6: Springfield Interstate Volumes

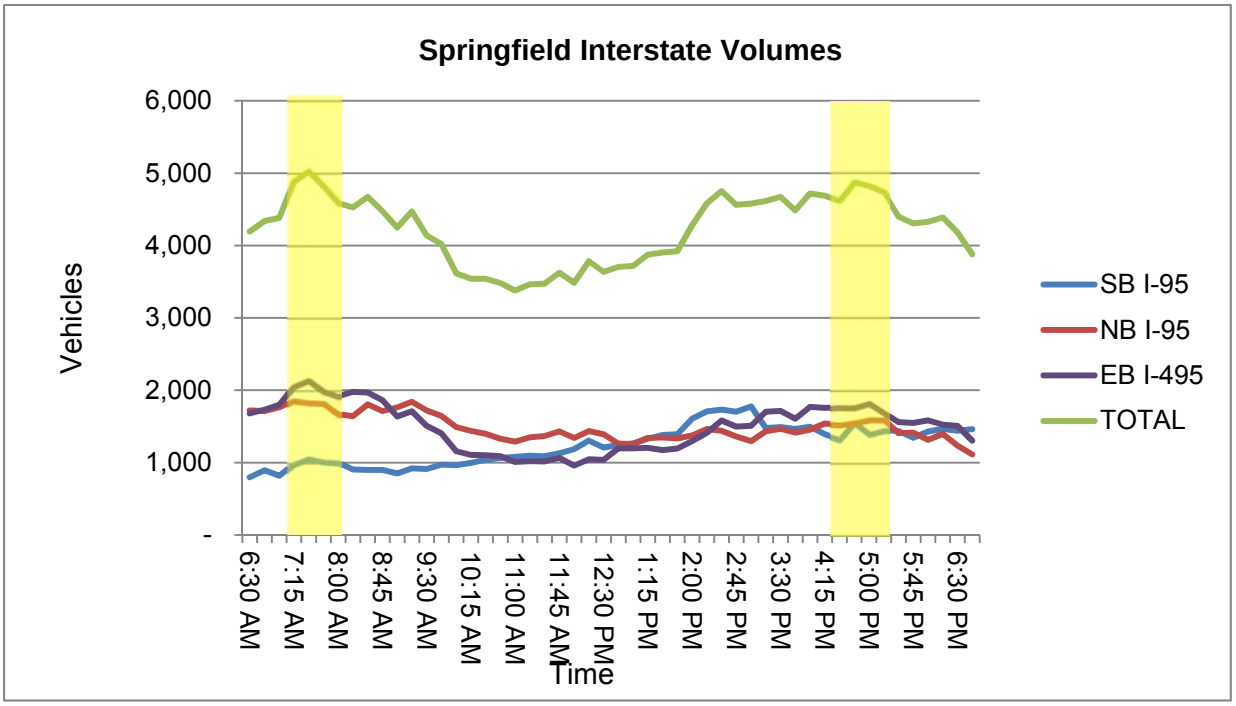


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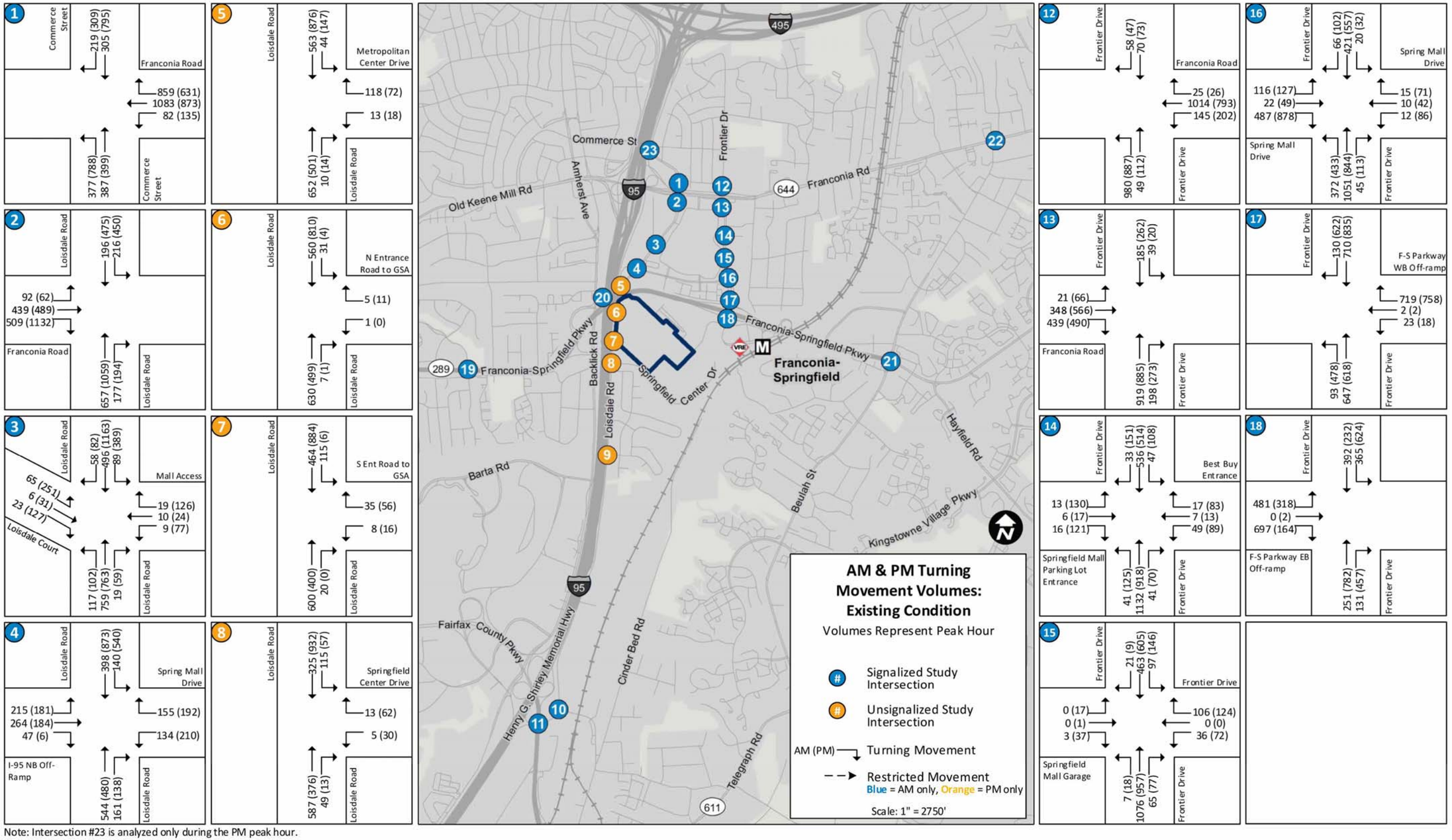
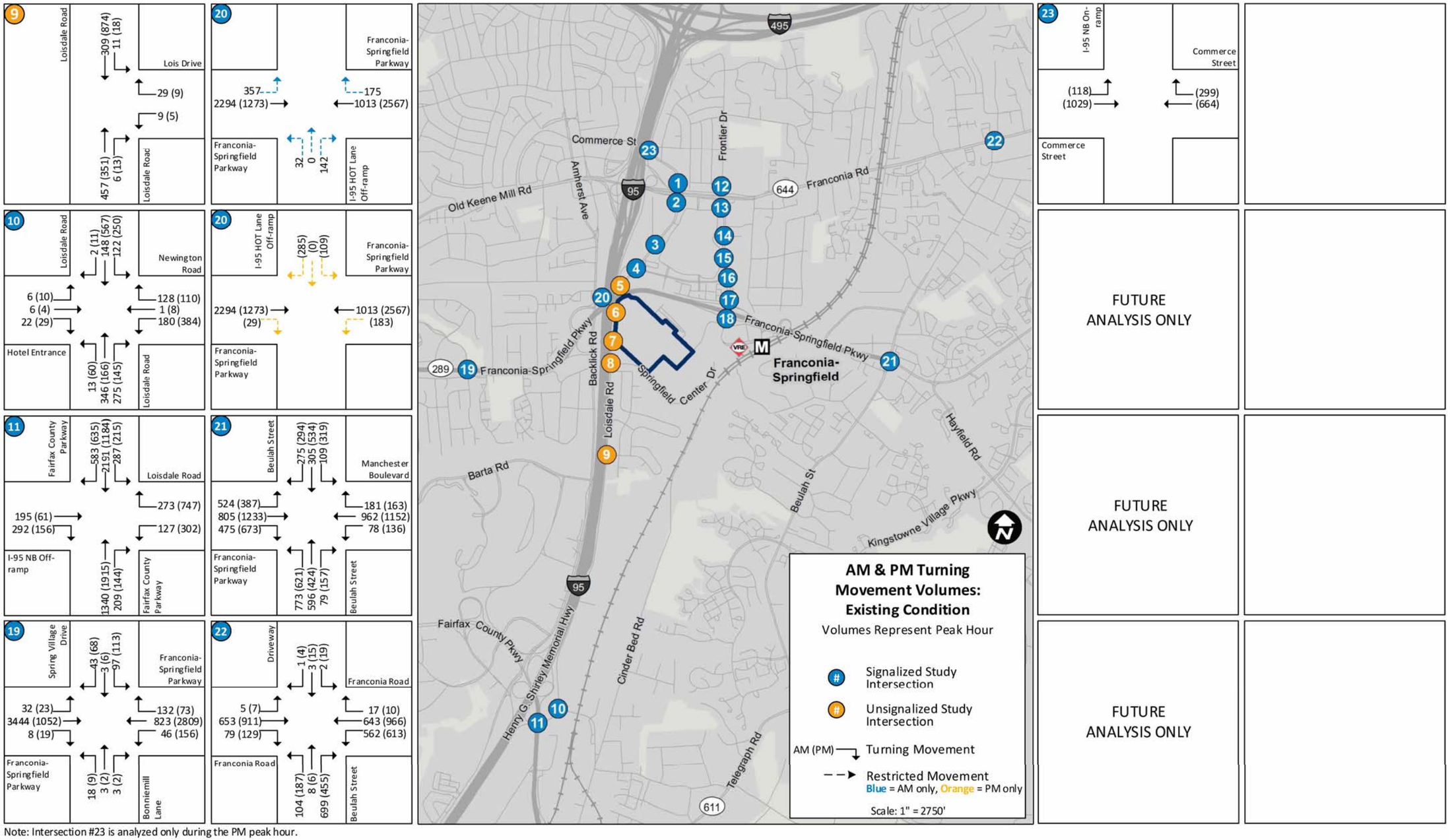
Figure 3-7: Existing AM and PM Peak Hour Turning Movement Volumes



Note: Intersection #23 is analyzed only during the PM peak hour.

Figure 3-7: Existing AM and PM Peak Hour Turning Movement Volumes (continued)



Note: Intersection #23 is analyzed only during the PM peak hour.

3.2 Pedestrian Network

The pedestrian accommodations within a 0.5-mile non-traffic study area are examined in this section and include observations of the pedestrian environment and measurements of sidewalk widths. This information was gathered through site observations and measurements in May 2015 (Site Visit, May 8, 2015), the use of Google maps consisting of images from fall 2014 (https://maps.google.com), and local planning documents. Measurements were recorded from the edge of the sidewalk to the edge of the curb. This section includes a description of where sidewalks are present, origin and destination points of pedestrians and/or commonly used sidewalks in the study area, disruptions or obstacles in the pedestrian environment, and general Americans with Disabilities Act (ADA) compliance.

3.2.1 Overall Sidewalk Observations

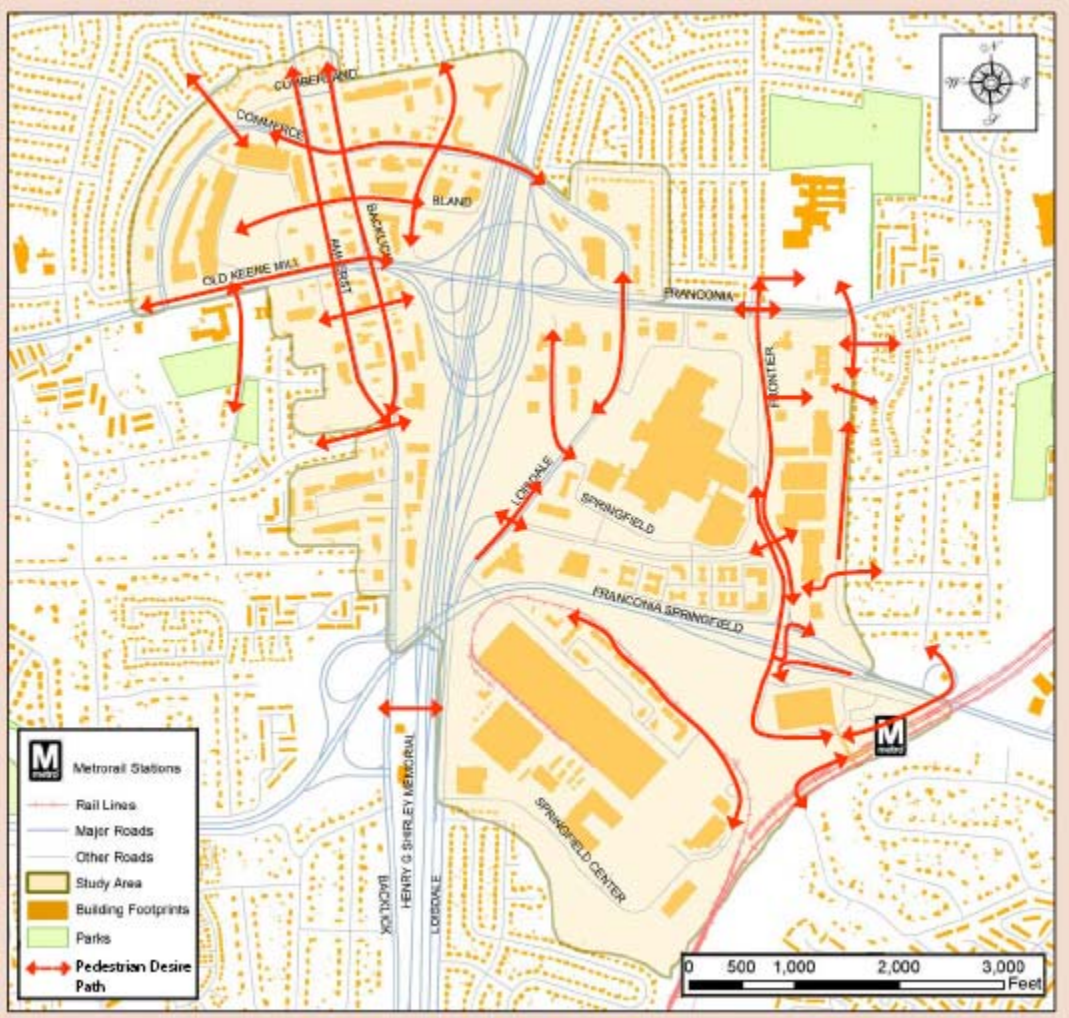
Sidewalk accommodations are provided on most streets in the 0.5-mile radius non-vehicular study area. Within this study area, there are minor issues with width, vegetation overgrowth, and/or accessibility compliance at intersections, but the overall quality of the pedestrian network is adequate. Facilities are considered adequate if sidewalk conditions are in decent condition (only small amounts of overgrowth, cracks, or uneven pavement) and are at least 4-feet wide. Adequate pedestrian facilities at intersections include crosswalks, pedestrian signs/signals, and ramps.

Sidewalks are provided along a majority of the roads throughout the study area, including Franconia-Springfield Parkway, Loisdale Road, Metropolitan Center Drive, Spring Mall Drive, Frontier Drive, and Backlick Road, as shown in figure 3-9 (below). There are sections of road along Franconia-Springfield Parkway, Loisdale Road, Backlick Road, and Metropolitan Center Drive that do not have walkways on both sides of the roadway. Intersections in the study area have a mixed level of accommodations for pedestrians, ranging from adequate (crosswalks, traffic lights, and pedestrian signals) to inadequate (traffic lights with no crosswalks, ramps, or pedestrian signs/signals). Based on these definitions, the majority of intersections in the study area have adequate accommodations.

The origins and destinations of pedestrian trips in the area are a mix of retail, transportation-oriented, and residential. The Franconia-Springfield Metro Station, a transit hub with Metrorail, commuter rail, and bus service, is located to the east of the Springfield site and has high amounts of pedestrians throughout the day, particularly during the morning and afternoon peak hours. The Springfield study area contains a variety of residential neighborhoods that produce dispersed pedestrian traffic along roadways and between residential neighborhoods and local retail stores.

Similar to the destination points, commonly used walkways around the site include paths used to navigate to public transportation, retail areas, and restaurants. The main pedestrian paths of desire are illustrated with red arrows in figure 3-8. Walkways used frequently by pedestrians to navigate to public transportation include paths on Frontier Drive and the roadways surrounding the Franconia-Springfield Metro Station. Frontier Drive and Elder Avenue are popular pedestrian paths between the retail stores in Springfield Town Center and residential areas. Backlick Road, Amherst Avenue, Franconia Road, and Commerce Street are also popular pedestrian paths between retail locations (Cambridge Systematics Inc. et al. 2008). Additional pedestrian pathways include walkways throughout residential neighborhoods.

Figure 3-8: Pedestrian Desire Paths from Springfield Connectivity Study



Source: Cambridge Systematics Inc. et al. (2008)

As mentioned in table 3-1 below in Section 3.3, pedestrians and bicyclists share multi-use pathways for recreational opportunities such as walking, biking, and skating. These pathways also provide a transportation function. The multi-use pathways within the 0.5-mile non-traffic study area include the Franconia-Springfield Metro Station Access Road, Barry Road Connector, Frontier Drive, Franconia-Springfield Parkway, and Loisdale Road.

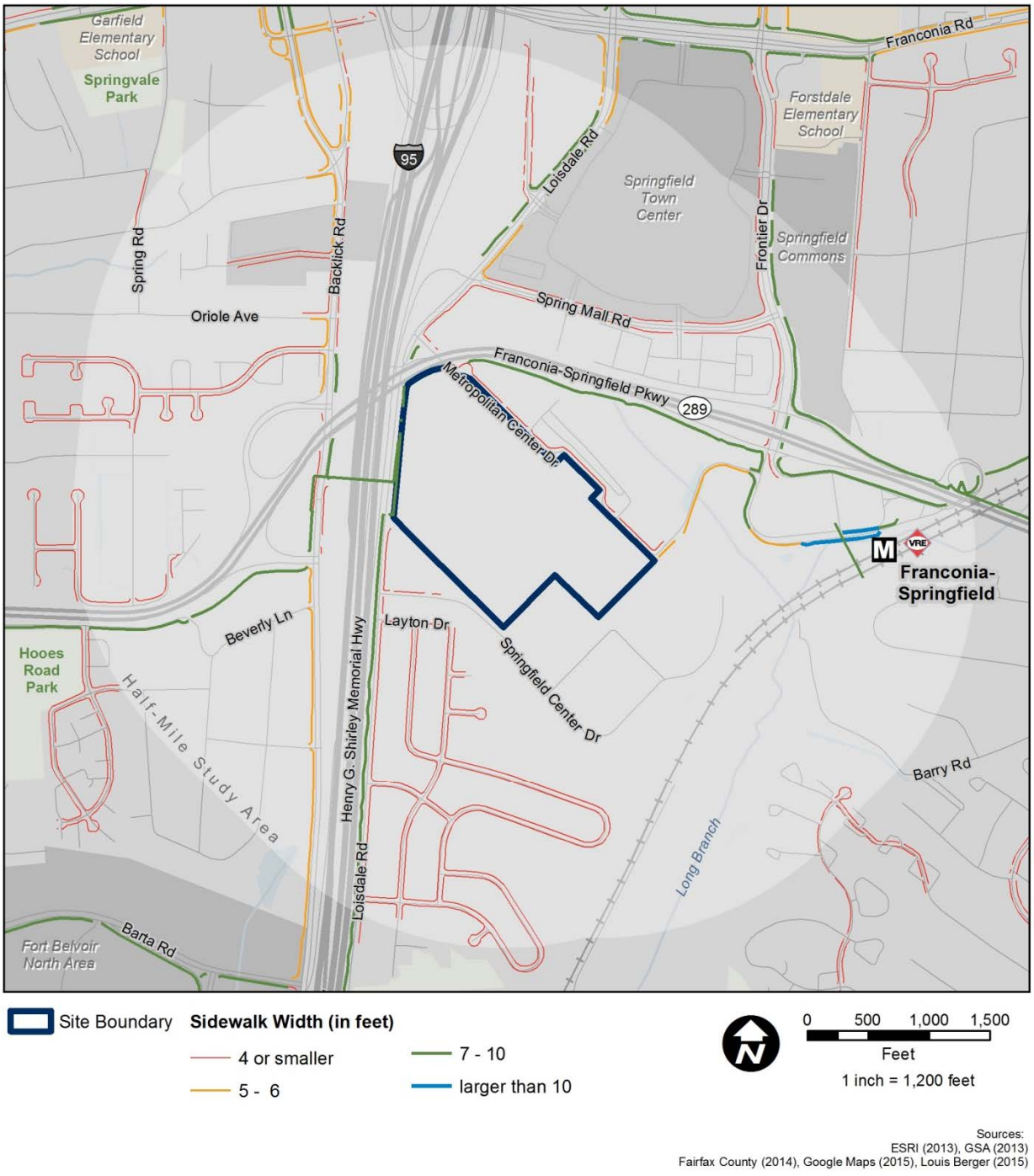
The study area is dominated by vehicle infrastructure, and pedestrian movement is complicated by high vehicle speeds and volumes and wide roadway cross-sections in some locations. The major roads in the study area, such as Franconia-Springfield Parkway and I-95, divide the area and complicate non-motorized transportation. Also within this study area, there are minor issues with sidewalk width, vegetation overgrowth, and/or accessibility compliance at intersections (see Section 3.2.2), but the overall quality of the pedestrian network is adequate. Facilities are considered adequate if sidewalk conditions are in decent condition (only small amounts of overgrowth, cracks, or uneven pavement) and are at least 4 feet wide, while adequate pedestrian facilities at intersections include crosswalks, pedestrian signs/signals, and ramps.

3.2.2 Accessibility Compliance

According to ADA, there is a minimum requirement of 3-foot clearances on street curb ramps, as well as minimal slopes and detectable warnings (i.e., dome-shaped bumps) (United States Department of Justice [USDOJ] 2007). Due to long blocks and generally consistent sidewalk widths along each block, ADA compliance focused on sidewalk widths and less on intersection ramp compliance. However, more than half of the intersection crosswalks in the study area are ADA-compliant and the main intersection between the Springfield site and the Metrorail station met the ADA curb ramp standards.

The Federal Highway Administration (FHWA) guidelines recommend that sidewalks have a minimum width of 5.0 feet if setback from the curb or 6.0 feet if at the curb face (FHWA 2014). Any sidewalk width less than 5.0 feet must be 3.0 feet wide with 5–foot turn-around locations every 200 feet to meet the minimum requirements for people with disabilities (USDOJ 2010). This minimum sidewalk width requirement was adhered to for a large majority of the non-residential study area. However, residential community sidewalks, including Metropolitan Center Drive, and portions of the walkways along Spring Mall Drive, Frontier Drive, and Backlick Road, were observed to be less than 5.0 feet wide and therefore do not meet FHWA guidelines (see figure 3-9). Depending on turn-around locations, these narrower sidewalks also may not meet ADA requirements.

Figure 3-9: Existing Pedestrian Network



3.3 Bicycle Network

The only on-road bicycle facilities in the immediate area surrounding the Springfield site are recent bicycle lanes that were added in early 2015 along Frontier Drive between Franconia-Springfield Parkway and Spring Mall Drive (Site Visit, May 8, 2015). Additionally, there are several multi-use paths as well as a few sidewalk accommodations that appear wide enough to be considered a multi-use path (portions of Frontier Drive) within the study area (see table 3-1 and figure 3-10). A multi-use path is present on the northern side of the site along

Franconia-Springfield Parkway. This trail follows the Franconia-Springfield Parkway and crosses I-95 via a pedestrian bridge near the site, then continues west for several miles before becoming the Fairfax County Parkway Trail. Near this transition, the trail also connects with the Cross County Trail. There are several other multi-use paths in the study area including one extending south from the site along Loisdale Road, paths around the Franconia-Springfield Metro Station and along the Franconia-Springfield Metro Station Access Road, a path that connects the metro station to Barry Road through the Virginia Railway Express (VRE) station, and a multi-use path or wide sidewalk along the eastern side of Frontier Road north of Spring Mall Drive. The Fairfax County Bicycle Master Plan also shows that a segment north of and parallel to Metropolitan Center Drive as an existing off-road trail; however, this pathway appears to be very overgrown based on Google aerial imagery from 2015 and may need improvements to be considered a usable mixed-use trail (Fairfax County 2014a; Google maps, https://maps.google.com/, accessed June 23, 2015). There is no bikeshare service within the study area.

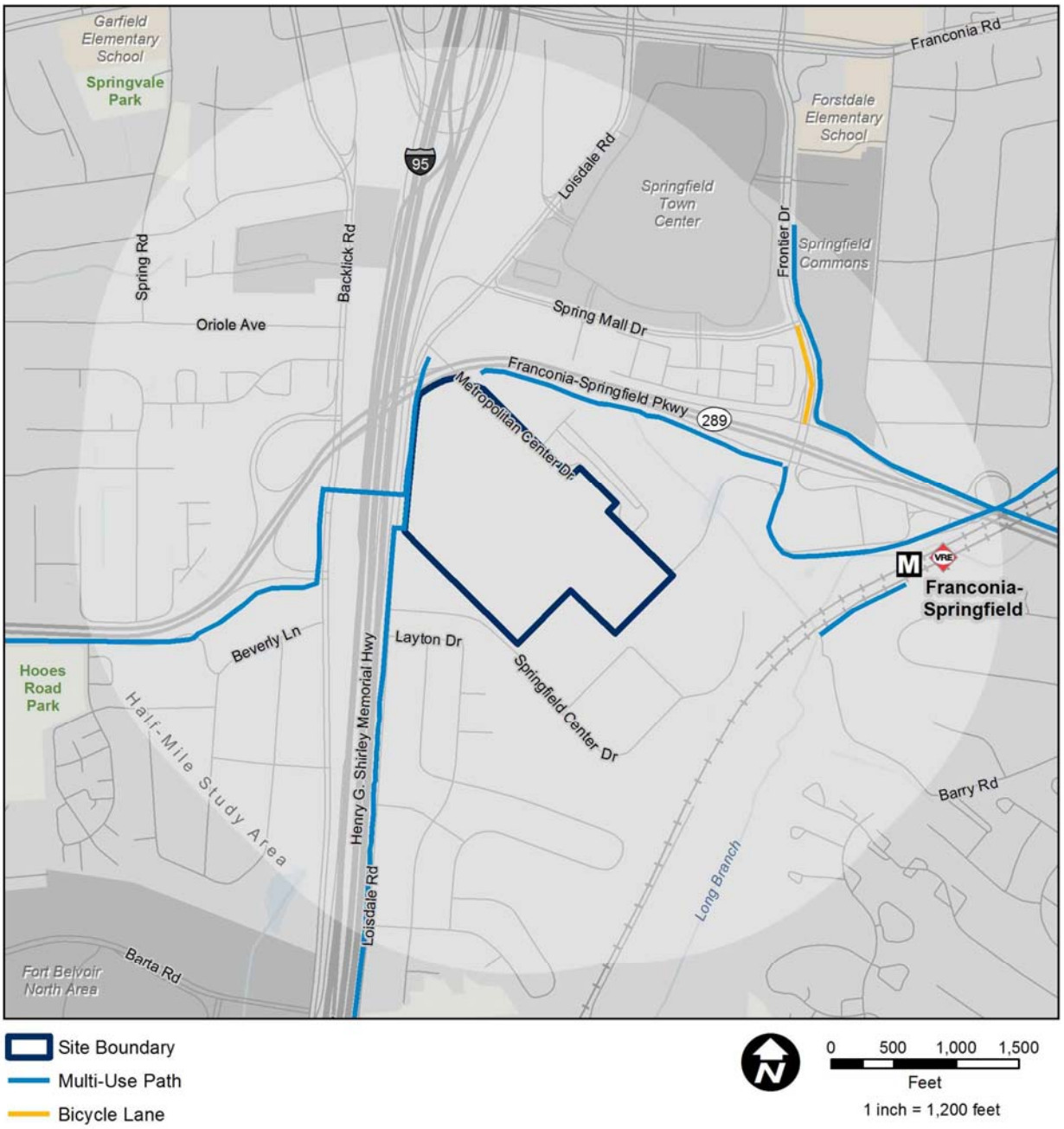
Table 3-1: Bicycle Facilities in the Springfield Site Study Area

Name	To/From	Type
Franconia Springfield Metro Station Access Road	From Franconia-Springfield Parkway to Franconia-Springfield Metro Station, with connection to Franconia-Springfield Parkway via underpass	Multi-Use Path
Barry Road Connector	Franconia-Springfield VRE Station to Barry Road	Multi-Use Path
Frontier Drive	From Franconia-Springfield Parkway to south of Franconia Road	Multi-Use Path
Frontier Drive	From Spring Mall Drive to Franconia-Springfield Parkway	Bicycle Lane
Franconia-Springfield Parkway	Full length within study area adjacent to roadway; from Beulah Street east of the station, past the Franconia-Springfield Metro Station, across I-95 via the pedestrian bridge, and west along the parkway to Rolling Road and Fairfax County Parkway	Multi-Use Path
Loisdale Road	Metropolitan Center Drive south to Fairfax County Parkway	Multi-Use Path
Segment north of and parallel to Metropolitan Center Drive [a]	Franconia-Springfield Parkway Trail to Frontier Drive Extension	Multi-use Path

[a] Although the "segment north of and parallel to Metropolitan Center Drive" is shown as an existing off-road trail in the Fairfax County Bicycle Master Plan, this pathway appears to be very overgrown based on Google aerial imagery from 2015 and may need improvements to be considered a usable mixed-use path.

Source: Fairfax County (2015a); Google maps aerial imagery (https://maps.google.com/); Site Visit (May 8, 2015); Fairfax County (2014a)

Figure 3-10: Existing Bicycle Facilities



3.4 Public Transit

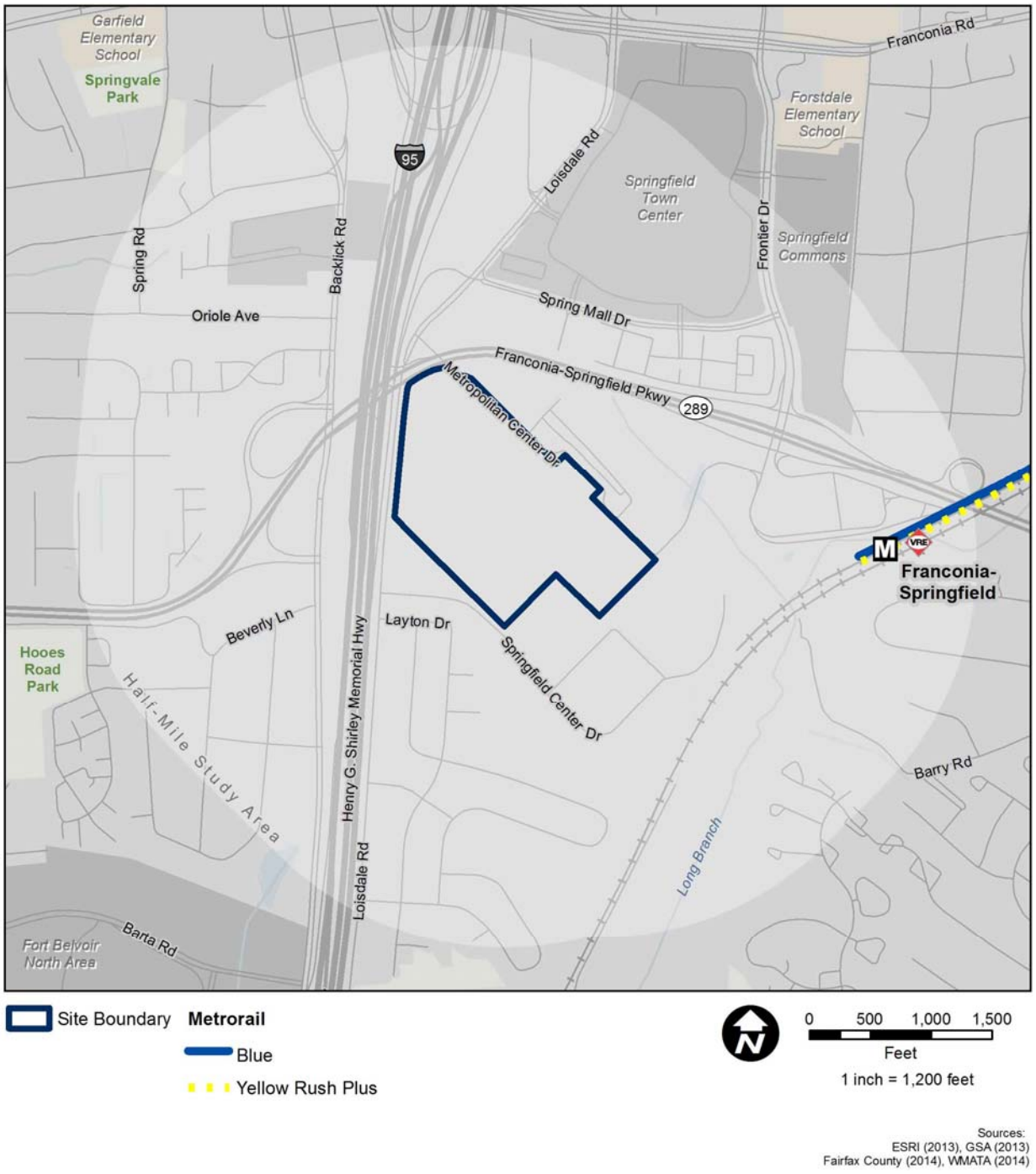
This section describes the existing conditions of Metrorail, commuter rail, local and intercity bus, shuttles, ridesharing (slugging), and carsharing within the Springfield study area. Note that the station and bus analysis results throughout the TIA includes rounding; therefore, values may not add up to the precise value indicated. The main transit hub in the study area is the Franconia-Springfield Metro Station, about 0.5 mile from the

Springfield site, which collectively consists of the Metro Station and parking garage, the Springfield VRE station, and the bus stops at the metro station served by various providers.

3.4.1 Franconia-Springfield Metro Station

The Springfield site is located adjacent to the Franconia-Springfield Metro Station (figure 3-11). The WMATA Metrorail Blue line serves this station during all operating hours, and the Yellow line serves the station during peak periods.

Figure 3-11: Springfield Study Area Metrorail Stations



3.4.1.1 *Franconia-Springfield Metro Station Frequency of Service*

Franconia-Springfield Metro Station is served by the Blue line during all operating hours, and by the Yellow line during portions of the AM and PM peak periods (6:30 AM to 9:00 AM, and 3:30 PM to 6:00 PM) under what WMATA calls “Rush Plus” service. During weekday peak periods, a Blue line and Yellow line train are scheduled to serve Franconia-Springfield Metro Station every 12 minutes, making the effective wait time between trains only 6 minutes if trains are on-time because a total of 10 trains are scheduled to serve the station every hour (five Blue and five Yellow). During weekday midday and evening hours, a Blue line train is scheduled to service the station every 12 minutes. After 9:30 PM, trains are scheduled to service Franconia-Springfield every 20 minutes. On weekends, trains are scheduled to service the station every 12 to 20 minutes. Table 3-2 summarizes Metrorail frequency and span of service at the station.

Table 3-2: Metrorail Frequency of Service at Franconia-Springfield Metro Station

Day	Period	Span of Service	Headway (Minutes)		
			Blue	Yellow Rush +	Effective Headway
Weekday	Peak	5:00 AM to 9:30 AM / 3:00 PM to 7:00 PM	12	12	6
	Midday	9:30 AM to 3:00 PM	12	-	-
	Evening	7:00 PM to 9:30 PM	12	-	-
	Late Night	9:30 PM to 12:00 AM*	20	-	-
Saturday	Daytime	7:00 AM to 9:30 PM	12	-	-
	Late Night	9:30 PM to 3:00 AM	20	-	-
Sunday	Daytime	7:00 AM to 9:30 PM	15	-	-
	Late Night	9:30 PM to 12:00 AM	20	-	-

[a] Service is extended to 3:00 AM on Fridays.
Note: Effective headways are calculated by dividing an hour (60 minutes) by the total number of trains that are scheduled to serve the station during an hour (12-minute headways = 5 trains/hour, 5+5 = 10 trains/hour and 60 ÷ 10 = 6-minute headways).
Source: WMATA (2014a)

3.4.1.2 *Franconia-Springfield Metro Station Mode of Access, 2012*

The *2012 Metrorail Passenger Survey* (WMATA 2013a) details mode of access of all Metrorail stations in the system. The majority of passengers (71 percent) access Franconia-Springfield Metro Station by driving and parking. Nine percent of passengers use a bus to access the station (Metrobus or Fairfax Connector), while 9 percent are dropped off using the Kiss & Ride lot. Table 3-3 summarizes all modes of access to the station, and their

Table 3-3: Mode of Access to Franconia-Springfield Metro Station in 2012

Mode	Percent of Total Passengers
Drove & Parked	70.8
Kiss & Ride	8.5
Fairfax Connector	6.9
Walked	4.8
Metrobus	2.5
VRE	1.9
Shuttle	1.5
Bicycle	1.3
Rode & Parked	1.2
Other Bus	0.6

Source: WMATA (2013a)

3.4.1.3 Franconia-Springfield Metro Station Infrastructure

The entrance to the Franconia-Springfield Metro Station is located off Franconia-Springfield Parkway in Springfield, Virginia. The main entrance to the Metrorail mezzanine is via a service road just north of the station that connects Frontier Drive and Franconia-Springfield Parkway. A second pedestrian entrance south of the station mezzanine connects to Barry Road via a pedestrian sidewalk. The station mezzanine is over the Metrorail tracks, one level above the street.

The north side of the station has a large commuter parking garage as well as a bus loop. The Franconia-Springfield VRE station is located just south of the Metrorail station (discussed further in Section 3.4.2 *Commuter Rail*).

The station has several large parking lots that can accommodate 5,214 cars (see table 3-4). It also has 56 bicycle parking spaces in the form of bicycle racks and bicycle lockers.

Table 3-4: Automobile and Bicycle Parking at Franconia-Springfield Metro Station

Type	Number
All-Day Parking Spaces	5,149
Long-Term Parking Spaces	17
Short-Term Metered Spaces	48
Bicycle Racks	36
Bicycle Lockers	20

Source: WMATA (2015a)

The Franconia-Springfield Metro Station has several vertical infrastructure elements and fare infrastructure elements. Because the mezzanine at the station is above ground level, there are vertical elements between the street and the mezzanine and the mezzanine and the platform. There are three street-to-mezzanine escalators (two to the north-side bus loop and one to the south-side VRE platforms), two street-to-mezzanine elevators (one to the north-side bus loop and one to the south-side VRE platforms), and two staircases (one to the north-side

bus loop and one to the south-side VRE platforms). Between the mezzanine and the Metrorail platform, there are three escalators, one staircase, and a single elevator. Two escalators are paired together serving opposite directions, with the remaining escalator (which operates in the upward direction toward the platform) paired with the single staircase. The station mezzanine has 11 faregate aisles (including one ADA aisle) and several farecard vending machines. Table 3-5 summarizes the vertical infrastructure elements at the Franconia-Springfield Metro Station.

Table 3-5: Franconia-Springfield Metro Station Vertical and Fare Infrastructure

Infrastructure	Location	Element	Number of Existing Elements	Notes
Vertical Circulation	Street to Mezzanine	Escalators	3	2 to bus loop, 1 to VRE
		Elevators	2	1 to bus loop, 1 to VRE
		Stairs	2	1 to bus loop, 1 to VRE
	Mezzanine to Platform	Escalators	3	-
		Elevators	1	-
		Stairs	1	-
Farecard Vendors		Passes Only	0	-
		Farecards and Passes	9	-
		SmarTrips	2	-
		Exit Fare	1	-
Faregate Aisles		Standard	10	-
		ADA	1	-
		Total	11	-

Source: Franconia-Springfield Metro Station Site Visit (December 19, 2014)

3.4.1.4 Franconia Springfield Metro Station Bus Loop

The bus loop at the Franconia-Springfield Metro Station is located north of the station platform between the platform and the Park & Ride garage. The loop contains eight bus bays, all of which are occupied by current services. Bays are generally segregated by agency, a common practice at Metrorail Station bus loops. Fairfax Connector routes use six bays, Metrobus routes use one, and the Potomac and Rappahannock Transportation Commission (PRTC) uses one.

During the peak hour of 7:00 AM to 8:00 AM, four bays exceed WMATA's standard of six buses per hour per bay (WMATA 2008b), and two of those exceed the maximum acceptable standard of 12 buses per hour (assuming 2 minutes of loading/unloading time and 3 minutes for layover) (WMATA 2013b). Bay F, which is served by seven Fairfax Connector routes, and Bay D, which is served by four Metrobus routes, each have 19 buses per hour. Overall, 70 buses serve the bus loop per hour (excluding Greyhound buses, which vary), while the WMATA standard capacity of the loop is only 48 buses per hour. The maximum acceptable capacity, however, is 96 buses per hour. Technically, buses could be redistributed over the eight bays so that only nine buses per hour served each bay. Due to the uneven distribution of trips per route however, and the desire to keep each route in a single bay by direction at least, this distribution would be difficult to obtain. Table 3-6 summarizes routes and buses per hour that serve each bus bay at the station.

Table 3-6: Station Bus Loop Bus Bay Assignments and Capacity at Franconia-Springfield Metro Station

Bay	Metrobus	Fairfax Connector	PRTC	Other	Peak Buses/ Hour
A	-	494	-	Greyhound	5
B	-	232, 322, 333, 334, 335	-	-	10
C	S80	-	P-MD	-	2
D	18R, 18S, S80, S91		-	-	19
E	-	305, 321, 401, 402	-	-	8
F	-	301, 310 EB, 333, 334, 371, 372, 373	-	-	19
G	-	310 WB, 322	-	-	3
H	-	231	-	-	4
Total					**70**
WMATA Standard Capacity					**48**
Maximum Acceptable Capacity					**96**
Average Buses per Bay					**9**

Source: Franconia-Springfield Metro Station Site Visit (December 19, 2014); WMATA (2015cb)

3.4.1.5 Franconia-Springfield Metro Station Ridership

Average weekday ridership for the Franconia-Springfield Metro Station was obtained for October 2014 from WMATA (2014b). During this period, the station saw 7,566 entries (boardings) and 7,801 exits (alightings) on average.

Ridership by Hour at the Franconia Springfield Metro Station

The majority of entries into the Franconia-Springfield Metro Station occur between 6:00 AM and 9:00 AM. The peak hour for entries is between 7:00 AM and 8:00 AM, when 1,755 passengers enter the station. The number of entries decreases throughout the day, but increases again slightly between 3:00 PM and 6:00 PM with an afternoon peak of 285 entries between 5:00 PM and 6:00 PM. The high number of entrances in the morning compared to the low number in the afternoon shows that many riders who enter at the Franconia-Springfield Metro Station use the Metrorail system to commute to Arlington, Virginia; Washington, D.C.; or points beyond.

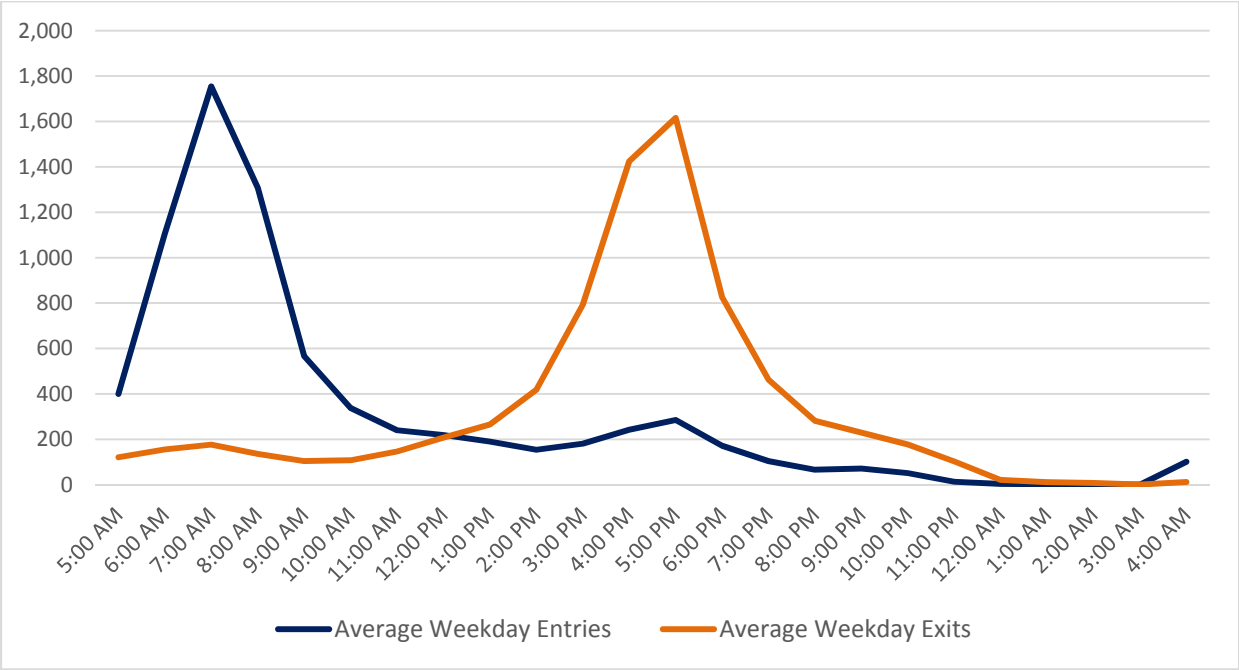
The majority of exits from the station occur between 4:00 PM and 6:00 PM. The peak hour for exits is between 5:00 PM and 6:00 PM, when 1,616 passengers exit at the station. The number of exits averages between 100 and 200 before 1:00 PM, and then slowly begins to increase into the afternoon, before dropping off again after 6:00 PM. Table 3-7 and figure 3-12 summarize entries and exits by hour at the station.

Table 3-7: Average Weekday Entries and Exits by Hour at the Franconia-Springfield Metro Station

Hour	Average Weekday Entries	Average Weekday Exits
5 AM	400	121
6 AM	1,106	156
7 AM	1,755	177
8 AM	1,308	136
9 AM	566	104
10 AM	338	108
11 AM	240	146
12 PM	219	208
1 PM	190	265
2 PM	154	418
3 PM	181	793
4 PM	242	1,424
5 PM	285	1,616
6 PM	172	826
7 PM	104	463
8 PM	66	281
9 PM	71	229
10 PM	51	177
11 PM	13	103
12 AM	3	20
1 AM	1	11
2 AM	1	8
3 AM	0	0
4 AM	101	12
Total	**7,566**	**7,801**

Source: WMATA (2014b)

Figure 3-12: Average Weekday Entries and Exits by Hour at the Franconia-Springfield Metro Station



Source: WMATA (2014b)

Peak 15-Minute Ridership at the Franconia-Springfield Metro Station

Peak hourly entries and exits and peak 15-minute period entries and exits at the station are consistent with totals in table 3-8. The peak 15-minute entry period occurs between 7:30 AM and 7:45 AM, and the peak 15-minute exit period occurs between 5:00 PM and 5:15 PM.

Table 3-8: Franconia-Springfield Metro Station Weekday Peak Hour and Peak 15-Minute Ridership

	Period	Time	Passengers
Entering	Peak 15-Min	7:30 AM	445
Entering	Peak Hour	7:00 AM	1,755
Exiting	Peak 15-Min	5:00 PM	486
Exiting	Peak Hour	5:00 PM	1,616

Source: WMATA (2014b)

3.4.1.6 Metrorail Origin-Destination at Franconia-Springfield Metro Station

The most common destination station for Metrorail passengers who enter at the Franconia-Springfield Metro Station is Pentagon Station, a major employment center. Overall, 737 weekday passengers (10 percent of all passengers who enter at Franconia-Springfield) exit at the Pentagon Station. The next most common destinations, Farragut West and McPherson Square, are located in downtown Washington, D.C., and are also major employment centers. Of the top 10 destination stations for Franconia-Springfield passengers, seven are located in Washington, D.C., with the exception of Pentagon and Crystal City, located in Arlington, Virginia, and King Street-Old Town, located in Alexandria, Virginia. All of the stations are served by the Metrorail Blue or Yellow lines. Table 3-9 summarizes the top destination stations for passengers who enter at Franconia-Springfield Metro Station.

Table 3-9: Top 10 Destinations for Passengers Entering at Franconia-Springfield Metro Station

Rank	To Station	Jurisdiction	Metrorail Lines	From Franconia-Springfield	Percent of Total
1	Pentagon	Arlington, VA	Blue, Yellow	737	10%
2	Farragut West	Washington	Blue, Orange, Silver	683	9%
3	McPherson Square	Washington	Blue, Orange, Silver	433	6%
4	Foggy Bottom	Washington	Blue, Orange, Silver	388	5%
5	King Street-Old Town	Alexandria, VA	Blue, Yellow	387	5%
6	L'Enfant Plaza	Washington	Green, Yellow, Blue, Orange, Silver	381	5%
7	Crystal City	Arlington, VA	Blue, Yellow	343	5%
8	Gallery Place-Chinatown	Washington	Green, Yellow, Red	334	4%
9	Metro Center	Washington	Blue, Orange, Silver, Red	252	3%
10	Archives-Navy Memorial	Washington	Green, Yellow	243	3%
	Total from Franconia-Springfield			**7,566**	

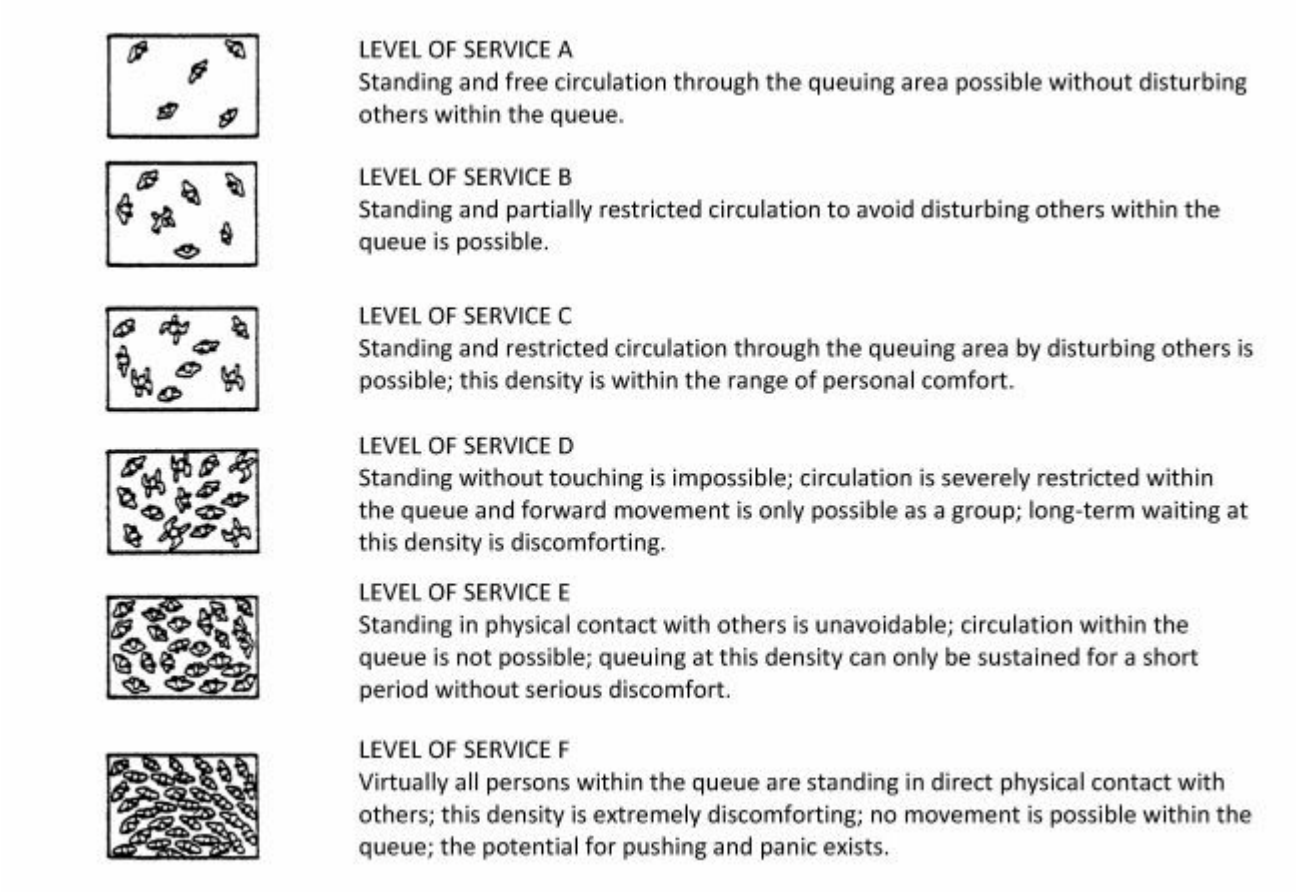
Source: WMATA (2014b)

3.4.1.7 Franconia-Springfield Metro Station Capacity Analysis

A capacity analysis was conducted for the vertical elements at the station, the station's faregate aisles, fare vending machines, and platform area. The platform area analysis and fare vending analysis used projected ridership from the peak entering period at the station – the time period when the most passengers would likely use fare vending machines and the highest number of passengers would be waiting on the platform. The remaining analyses, for the vertical elements and faregate aisles, used the peak 15-minute period of ridership at the station. October 2014 faregate data provided by WMATA was used for all of the capacity analyses (2014b). (March or October data are commonly used by transit agencies for analysis because these months are considered stable months that are less affected by tourism, weather, and holidays than other months.) At the Franconia-Springfield Metro Station, the peak 15-minute period of total ridership activity (entries and exits) was between 5:00 PM and 5:15 PM and the peak 15-minute entering period was between 7:30 AM and 7:45 AM.

At the station, there are three sets of vertical elements, those between the Metrorail platform and the mezzanine, those between the mezzanine and the street level (the bus loop and the Kiss & Ride lot), and those between the mezzanine and the Springfield VRE Station platforms. Only vertical elements between the mezzanine and Metrorail platform were analyzed, however, because the Metrorail station has higher ridership. None of the vertical elements, faregate aisles, or fare vending machines are above capacity, defined as a v/c ratio of 0.7 (see table 3-10). Additionally, there is sufficient capacity to accommodate the peak number of passengers on the station platform simultaneously at pedestrian level of service (LOS) B. Figure 3-13 illustrates the range of pedestrian level of service conditions. Appendix E3 further details the Franconia-Springfield Metro Station capacity analysis.

Figure 3-13: Pedestrian Level of Service Illustration



Source: TRB 2013

Table 3-10: Franconia-Springfield Metro Station Capacity Analysis Summary

Element		Volume to Capacity (V/C) Ratio
Street/ Mezzanine	Entry Escalators	0.02
	Exit Escalators	0.10
	Stairs	0.04
Mezzanine/ Platform	Entry Escalators	0.04
	Exit Escalators	0.21
	Stairs	0.12
Faregate Aisles		0.14
Fare Vending		0.11
Platform Peak LOS		B

3.4.1.8 Franconia-Springfield Metro Station Emergency Evacuation Analysis

Using the peak 15-minute ridership and National Fire Protection Association (NFPA) 130 assumptions and guidelines, the platform at the Franconia-Springfield Metro Station could be evacuated in 2.0 minutes, and the entire station could be evacuated to a point of safety within 6.2 minutes (TRB 2013). Appendix E4 further details the Franconia-Springfield Metro Station emergency evacuation analysis and NFPA-expected evacuation timeframes.

3.4.2 Commuter Rail

The VRE Fredericksburg line serves the study area at Springfield Station, which is adjacent to the Franconia-Springfield Metro Station as shown in figure 3-11. The Fredericksburg line connects major destinations including Fredericksburg, Virginia; Alexandria, Virginia; and Crystal City (Arlington, Virginia) to Washington, D.C., at L'Enfant Plaza Station and Union Station. The station is located at ground level directly south of the Metrorail station platform and is accessible via an escalator, staircase, and elevator from the Metrorail mezzanine. There are cash sale vendors located at the station, as well as three ticket vending machines. The station has two platforms (northbound and southbound) which are connected via a pedestrian overpass. There is also a pedestrian walkway that connects the northbound platform to Barry Road and a large residential neighborhood in Springfield (VRE 2015a).

Six trips on the Fredericksburg line serve Springfield Station in the northbound direction (Fredericksburg, Virginia, to Washington, D.C.) during weekday AM peak periods (between 6:11 AM and 8:35 AM). In the southbound direction, seven trips serve the station between 1:25 PM and 7:11 PM (VRE 2015b). No weekend or major holiday service is provided.

Ridership to and from Springfield Station was available for fiscal year 2014 (VRE 2014). Overall, there were more outbound (southbound) boardings than inbound (northbound) boardings, and more inbound alightings than outbound alightings (alightings are represented in the "Off" column in table 3-11). This trend is likely due to Metrorail providing parallel service on the Blue and Yellow lines between the station and points north, so many users ride VRE from points south to Springfield, then board Metrorail at the Franconia-Springfield Metro Station for points north. Table 3-11 summarizes average weekday boardings and alightings at the Springfield VRE Station for fiscal year 2014.

Table 3-11: FY2014 Ridership at Springfield VRE Station

Direction	On (Boarding)	Off (Alighting)
Inbound (Northbound)	769	1,825
Outbound (Southbound)	1,730	1,012
Total	**2,499**	**2,837**

Source: VRE (2014)

According to the updated FY2015 VRE Performance Measures (VRE 2015c), three Fredericksburg Line trips and one Manassas Line trip averaged passenger loads that exceeded capacity. Additionally, the 3:45 PM and 5:05 PM Manassas Line southbound trips exceeded capacity during midweek peak periods (Tuesdays through Thursdays). Table 3-12 summarizes VRE trips that experience overcrowding.

Table 3-12: VRE Trips that Experience Overcrowding, 2015

Line	Northbound Trips	Southbound Trips
Fredericksburg	-	3:35 PM, 4:10 PM, 4:40 PM
Manassas	-	3:45 PM

Source: VRE (2015c)

3.4.3 Bus Services: Local

The Springfield non-vehicular site study area, an area extending 0.5 mile from the site boundary, is served by WMATA Metrobus, PRTC, and Fairfax Connector (FXC) bus routes. All routes connect the Franconia-Springfield Metro Station with various parts of Fairfax County including Burke, Tysons Corner, and Lorton. The PRTC Prince William Metro Direct (P-MD) route is the only local bus service that travels outside Fairfax County; this route serves the Woodbridge and Dale City portions of Prince William County. The Springfield site does not provide bus service to Maryland or Washington, D.C. Table 3-13 and figure 3-14 summarize the major characteristics of bus routes serving the Springfield study area.

Table 3-13: Major Service Characteristics of Bus Routes Serving the Springfield Study Area

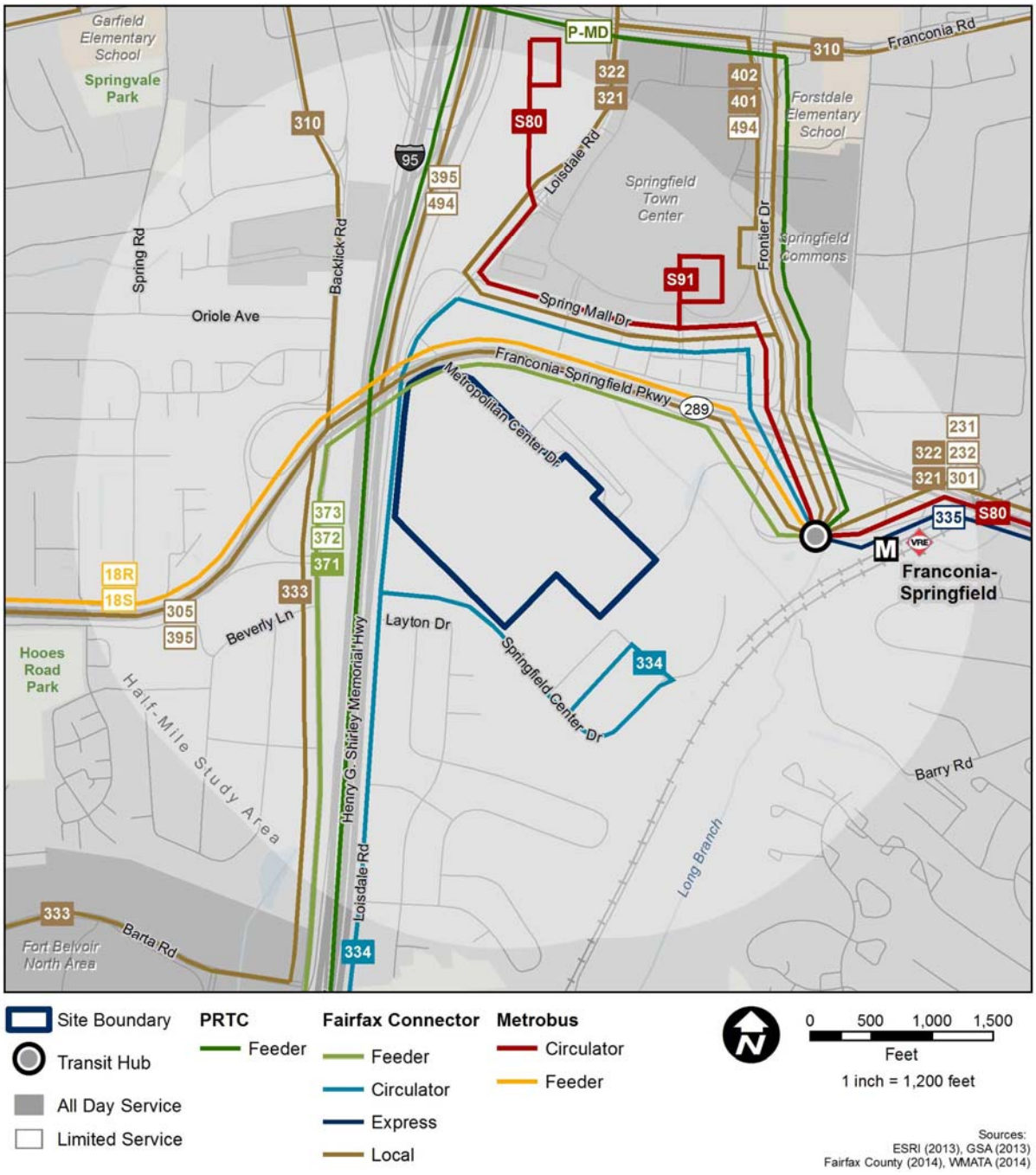
Route	Agency	Description	Route Type	Major Destinations
18R	WMATA	Burke Central Line	Feeder	Rolling Valley Mall, Gambrill Road, Franconia-Springfield Metro Station
18S	WMATA	Burke Central Line	Feeder	Rolling Valley Mall, Old Knee Mill Road, Franconia-Springfield Metro
S80	WMATA	Springfield Circulator	Circulator	Franconia-Springfield Metro Station, Springfield Town Center, Hilton Springfield
S91	WMATA	Springfield Circulator	Circulator	Franconia-Springfield Metro Station, Springfield Town Center, Hilton Springfield
P-MD	PRTC	Prince William Metro Direct	Feeder	PRTC Transit Center, Potomac Mills, Horner Road Commuter Lot, Franconia-Springfield Metro Station
231	FXC	Kingstowne Counter-clockwise	Local	Franconia-Springfield Metro Station, Van Dorn Street Metro Station
232	FXC	Kingstowne Clockwise	Local	Franconia-Springfield Metro Station, Van Dorn Street Metro Station
301	FXC	Telegraph Road	Local	Franconia-Springfield Metro Station, Huntington Metro Station
305	FXC	Newington Forest - Silverbrook Road	Local	Lorton VRE Station, Gambrill Park and Ride, Franconia-Springfield Metro Station
305	FXC	Newington Forest - Silverbrook Road	Local	Lorton VRE Station, Gambrill Park and Ride, Franconia-Springfield Metro Station
310	FXC	Franconia Road - Rolling Valley	Local	Rolling Valley Park and Ride, Franconia-Springfield Metro Station, Huntington Metro Station
321	FXC	Springfield Counter-clockwise	Local	Franconia-Springfield Metro Station, Van Dorn Street Metro Station
322	FXC	Springfield Clockwise	Local	Franconia-Springfield Metro Station, Van Dorn Street Metro Station

Table 3-13: Major Service Characteristics of Bus Routes Serving the Springfield Study Area (continued)

Route	Agency	Description	Route Type	Major Destinations
333	FXC	Patriot Ridge - Saratoga	Local	Saratoga Park and Ride, Franconia-Springfield Metro Station
334	FXC	DLA Circulator	Circulator	Franconia-Springfield Metro Station, NVCC Medical College, Defense Logistics Agency
335	FXC	Fort Belvoir "Eagle Express"	Express	Franconia-Springfield Metro Station, Middleton Road Post Office
371	FXC	Lorton - Franconia-Springfield Metro	Feeder	Lorton Park and Ride, VRE Lorton Station, Franconia-Springfield Metro Station
372	FXC	Lorton - Franconia-Springfield Metro	Feeder	Lorton Park and Ride, VRE Lorton Station, Franconia-Springfield Metro Station
373	FXC	Lorton - Franconia-Springfield Metro	Feeder	Lorton Park and Ride, VRE Lorton Station, Franconia-Springfield Metro Station
401	FXC	Backlick - Gallows Northbound	Local	Franconia-Springfield Metro Station, Springfield Mall, INOVA Fairfax Hospital, Dunn Loring Metro Station, Tysons Corner Metro Station
402	FXC	Backlick - Gallows Southbound	Local	Tysons Corner Metro Station, Dunn Loring Metro Station, INOVA Fairfax Hospital, Springfield Mall, Franconia-Springfield Metro Station
494	FXC	Springfield - Tysons	Express	Franconia-Springfield Metro Station, Tysons West Park Transit Center

Source: WMATA (2014c); Fairfax County (2014b); PRTC (n.d.)

Figure 3-14: Bus Routes Serving the Springfield Study Area



3.4.3.1 Bus Frequency of Service

The majority of routes serving the site are commuter-oriented, operating primarily during AM and PM peak periods. The PRTC Prince William Metro Direct (P-MD) and Fairfax Connector (FXC) routes 401 and 402 are the only route that operates before 6:00 AM and after 11:00 PM. WMATA Routes S80 and S91 and Fairfax Connector Routes 401 and 402 are the only routes that operate regularly from 6:00 AM until 11:00 PM. These routes also have the most frequent service. The FXC routes operate primarily during AM and PM peak periods. During peak periods, the FXC routes generally operate with 30 to 45 minute headways. Routes 301, 305, 335, 372, 373, and

494 do not operate after 7:00 PM. Table 3-14 summarizes headways and spans of service on routes that serve the Springfield site.

WMATA Routes S80 and S91 are Transportation Association of Greater Springfield (TAGS) routes. TAGS is a non-profit organization dedicated to achieving improvements to the Springfield transportation system. TAGS routes are operated by WMATA and offer a low-cost shuttle service through Springfield's business district. TAGS offers with free service between the Franconia-Springfield Metro Station and Metro Park and a $0.50 fare to other destinations (TAGS 2014).

Service changes to Fairfax Connector routes were implemented on May 16, 2015, in response to rider feedback and to improve on-time performance, enhance connectivity between routes and Metrorail, and expand connections in the I-95 and I-395 corridors (Fairfax County 2015c). Schedule adjustments were made to Routes 401, 402, and Route 493 was extended to the Lorton VRE Station and the Saratoga Park & Ride.

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Table 3-14: Frequency of Service on Bus Routes Serving the Springfield Study Area

Route & Direction	Agency	Weekday								Saturday		Sunday	
		Headway (Minutes)						Number of Trips	Span of Service	Headway (Minutes)	Span of Service	Headway (Minutes)	Span of Service
		4AM to 6AM	6AM to 9AM	9AM to 3PM	3PM to 7PM	7pm to 11pm	11PM to 4AM						
18R East	WMATA	-	45	-	-	-	-	4	6:13 AM to 8:31 AM	-	-	-	-
18R West	WMATA	-	-	-	40	2 trips	-	7	3:45 PM to 7:44 PM	-	-	-	-
18S East	WMATA	-	45	-	-	-	-	4	6:02 AM to 8:37 AM	-	-	-	-
18S West	WMATA	-	-	-	40	80	-	9	4:07 PM to 8:53 PM	-	-	-	-
S80	WMATA	-	14	16	15	2 trips	-	53	6:02 AM to 7:31 PM	-	-	-	-
S91	WMATA	-	22.5	180	30	2 trips		20	7:12 AM to 7:48 PM	-	-	-	-
P-MD	PRTC	2 trips	45	51	40	48	1 trip	10	5:10 AM to 11:23 PM	60	7:35 AM to 11:05 PM	-	-
231	FXC	-	30	-	-	60	-	22	4:50 AM to 10:14 PM	-	-	-	-
232	FXC	-	30	-	-	60	-	24	4:39 AM to 10:28 PM	-	-	-	-
301	FXC	-	30	-	-	-	-	26	5:40 AM to 8:20 PM	-	-	-	-
305	FXC	-	30	-	-	-	-	34	5:00 AM to 9:43 PM	-	-	-	-
310	FXC	-	25	-	30	60	-	88	4:22 AM to 1:08 AM	60	5:54 AM to 12:54 AM	60	5:54 AM to -11:54 AM
321	FXC	-	30	-	60	60	-	30	4:02 AM to 10:55 PM	60	6:33 AM to 11:17 PM	60	6:33 AM to 11:17 PM
322	FXC	-	30	-	60	60	-	28	4:10 AM to 10:21 PM	60	5:34 AM to 11:35 PM	60	5:34 AM to 11:35 PM
333	FXC	-	30	-	45	45	-	32	5:32 AM to 10:14 PM	-	-	-	-
334	FXC	-	25	-	45	45	-	32	5:23 AM to 11:15 PM	-	-	-	-
335	FXC	-	30	-	-	-	-	14	6:15 AM to 6:59 PM	-	-	-	-
371	FXC	-	-	-	30	60	-	39	4:02 AM to 1:15 AM	40	5:26 AM to 1:49 AM	50	5:26 AM to 12:50 AM
372	FXC	-	30	-	-	-	-	28	6:01 AM to 8:40 PM	-	-	-	-

Table 3-14: Frequency of Service on Bus Routes Serving the Springfield Study Area (continued)

Route & Direction	Agency	Weekday								Saturday		Sunday	
		Headway (Minutes)						Number of Trips	Span of Service	Headway (Minutes)	Span of Service	Headway (Minutes)	Span of Service
		4AM to 6AM	6AM to 9AM	9AM to 3PM	3PM to 7PM	7pm to 11pm	11PM to 4AM						
373	FXC	-	30	-	-	-	-	29	5:38 AM to 7:58 PM	-	-	-	-
401	FXC	-	15	-	15	30	-	58	3:35 AM to 1:28 AM	30	4:30 AM to 1:05 AM	30	4:30 AM to 1:04 AM
402	FXC	-	15	-	15	30	-	62	4:10 AM to 2:28 AM	30	5:30 AM to 2:11 AM	30	5:30 AM to 2:07 AM
494	FXC	-	16	-	2 trips	-	-	27	5:22 AM to 7:30 PM	-	-	-	-

Source: WMATA (2014c); Fairfax County (2014b); Fairfax County (2015c); PRTC (n.d.)

3.4.3.1 Ridership by Route

Average weekday ridership on routes that serve the study area are summarized in table 3-15. Overall, FXC Routes 401, 402, and 310 have the highest ridership, each with more than 1,500 average weekday boardings. Routes 401 and 402 connect Springfield with Merrifield and Tysons Corner, while Route 310 connects Springfield with Huntington. For WMATA, the highest ridership is on Route S80, with just more than 500 average weekday boardings. Route S80, an internal bus route operated by the Transportation Association of Greater Springfield, is a neighborhood circulator connecting major generators in Springfield, including Springfield Town Center (Fairfax County 2014c).

Table 3-15: Average Weekday Ridership by Bus Route Serving the Springfield Study Area

Route	Agency	Description	Average Weekday Boardings
401	FXC	Backlick - Gallows Northbound	2,683
310	FXC	Franconia Road - Rolling Valley	1,650
402	FXC	Backlick - Gallows Southbound	1,572
321	FXC	Springfield Counter-clockwise	826
371	FXC	Lorton - Franconia-Springfield Metro	772
322	FXC	Springfield Clockwise	694
S80	WMATA	Springfield Circulator	510
333	FXC	Patriot Ridge - Saratoga	241
232	FXC	Kingstowne Clockwise	228
231	FXC	Kingstowne Counter-clockwise	212
301	FXC	Telegraph Road	206
305	FXC	Newington Forest - Silverbrook Road	192
335	FXC	Fort Belvoir "Eagle Express"	188
334	FXC	DLA Circulator	141
S91	WMATA	Springfield Circulator	107
18S	WMATA	Burke Central Line	105
373	FXC	Lorton - Franconia-Springfield Metro	88
372	FXC	Lorton - Franconia-Springfield Metro	81
18R	WMATA	Burke Central Line	75
494	FXC	Springfield - Tysons	9
PW-MD	PRTC	Prince William Metro Direct	NA

Note: Ridership data unavailable for PRTC.
Source: WMATA (2014d); Fairfax County (2014c).

3.4.3.2 Ridership by Route and Direction

Ridership data by weekday time period were available for WMATA routes only. The AM and PM peak periods had the highest ridership overall, primarily due to the fact that most routes operate the majority of their trips during these periods. Route S80, which operates during the midday period, had significant ridership during that period as well. Table 3-16 summarizes these ridership statistics.

Table 3-16: Metrobus Ridership by Route, Direction, and Time Period in the Springfield Study Area

Route/Direction	AM Peak	Midday	PM Peak	Early Night	Weekday Total
18R East	28	-	-	-	28
18R West	-		42	5	47
18S East	37	-	-	-	37
18S West	-	-	50	18	68
S80 Loop	169	147	188	7	510
S91 Loop	43	9	45	10	107

Note: AM peak = 6A M to 9 AM; Midday = 9 AM to 3 PM; PM peak = 3 PM to 7 PM; Early Night = 7 PM to 11 PM
Source: WMATA (2014d)

Maximum passenger loads by weekday time period were also only available for WMATA routes. Route S80 has the highest passenger loads, with a maximum of 15 passengers per trip during the AM peak period. Route 18S has the second highest with 12 passengers in the eastbound direction during the AM peak period and 12 passengers in the westbound direction during the PM peak period. Typical capacity for the routes in the study is between 32 and 46 passengers, therefore no routes experience overcrowding. Table 3-17 summarizes maximum passenger loads by route and direction as well as capacities per trip on Metrobus routes in the study area.

Table 3-17: Metrobus Maximum Passenger Loads by Route, Direction, and Time Period in the Study Area

Route/Direction	AM Peak	Midday	PM Peak	Early Night	Capacity Per Trip
18R East	7	--	-	-	44
18R West	-	-	8	4	46
18S East	12	-	-	-	44
18S West		-	12	6	45
S80 Loop	15	7	12	4	32
S91 Loop	7	6	7	6	32

Note: AM peak = 6 AM to 9 AM; Midday = 9 AM to 3 PM; PM peak = 3 PM to 7 PM; Early night = 7 PM to 11 PM
Source: WMATA (2014d)

3.4.3.3 Stop Level Ridership

Average weekday ridership at the stop level was available for FXC and Metrobus (WMATA) routes. Table 3-18 shows the total number of boardings and alightings per weekday at bus stops in the study area. The six highest ridership stops are all bus bays at the Franconia-Springfield Metro Station. Franconia-Springfield Metro Station/Bus Bay F has the highest total activity, at 1,900 passengers. This bay is served by FXC Routes 310, 333, 334, 371, 372, and 373. Franconia-Springfield Metro Station/Bus Bay E has the second highest total activity, with 926 passengers. This bay is served by FXC Routes 321, 401, and 402. Outside of Franconia-Springfield Metro Station, the highest ridership stop is the Springfield Mall at JCPenney, which is served by FXC Routes 401 and 402 and has 107 passengers.

Table 3-18: Weekday Bus Ridership by Stop for Routes Serving the Springfield Study Area

Agency	Stop Name	Direction	Routes	Average Weekday Boardings	Average Weekday Alightings	Total Activity
FXC	Metrorail Franconia Springfield @ Bay F	NB	310, 333, 334, 371, 372, 373	1,071	829	1,900
FXC	Metrorail Franconia Springfield Bay E	-	321, 401, 402	519	407	926
WMATA	Metrorail Franconia Springfield / Bus Bay D	EB	18R, 18S, S80, S91	425	343	768
FXC	Metrorail Franconia Springfield @ Bay B	-	232, 322, 335	283	300	583
FXC	Metrorail Franconia Springfield @ Bay G	-	310	177	236	413
FXC	Metrorail Franconia Springfield Bay H	-	231	106	63	169
FXC	Springfield Mall @ JCPenney Entrance	WB	401, 402	72	35	107
FXC	Springfield Center @ Loisdale	-	334	43	59	102
FXC	Frontier @ Spring Mall	SB	310, 402, 494	15	86	101
WMATA	Spring Mall Drive / Junction Blvd	EB	S80, S91	37	39	76
FXC	Metrorail Franconia Springfield @ Bay A	NB	494	35	27	62
FXC	Backlick @ Spring Garden	SB	310	33	21	54
FXC	Backlick @ Spring Garden	NB	310	20	32	52
FXC	Spring Mall @ Junction	WB	322, 334, 401	30	12	42
FXC	Backlick @ Villa Park	SB	310	25	16	41
FXC	Backlick @ Oriole	NB	310	14	21	35
WMATA	Springfield Mall	WB	S80	15	19	33
FXC	Loisdale @ Loisdale	SB	321	5	20	25
FXC	Spring Mall @ Junction	EB	321, 334	6	18	24
WMATA	Spring Mall Drive / Junction Blvd	WB	S80, S91	4	17	21
FXC	Loisdale @ Loisdale	NB	322	15	3	18
WMATA	Loisdale Ct / #6551	NB	S80	4	14	18
FXC	Backlick @ Franconia Springfield Pw	SB	310, 371, 373	10	7	17
FXC	Loisdale @ Layton	NB	334	14	3	17

Table 3-18: Weekday Bus Ridership by Stop for Routes Serving the Springfield Study Area (continued)

Agency	Stop Name	Direction	Routes	Average Weekday Boardings	Average Weekday Alightings	Total Activity
FXC	Springfield Center @ Loisdale	SB	334	5	10	15
FXC	Amherst @ Backlick	NB	310	1	13	14
FXC	Loisdale @ Lois	NB	334	10	4	14
WMATA	Loisdale Ct / #6564	SB	S80	7	1	8
WMATA	Loisdale Ct / Franconia Rd	NB	S80	2	6	8
WMATA	Loisdale Ct / #6560	SB	S80	7	1	7
FXC	Frontier Drive @ Franconia Springfield Pw	NB	494	2	2	4
FXC	Loisdale @ Lois	SB	334	0	4	4
FXC	Springfield Center @ Loisdale	-	334	1	2	3

Source: WMATA (2014d); Fairfax County (2014c)

Maximum passenger loads by stop were available for Metrobus routes only, and are highest at the Franconia-Springfield Metro Station/Bus Bay D stop. Maximum passenger loads at the stop level represent the maximum number of passengers on a single bus after leaving that stop location. Route S80 and Route 18S westbound both see maximum passenger loads of 12 passengers at this stop. This is not indicative of overcrowding. Table 3-19 summarizes maximum passenger loads by stop, route, and direction in the study area.

Table 3-19: Metrobus Stops with Highest Maximum Passenger Loads by Route and Direction in the Springfield Study Area

Route	Direction	Stop Name	Weekday Maximum Passenger Load
S80	Loop	Franconia-Springfield Metro Station / Bus Bay D	12
18S	West	Franconia-Springfield Metro Station / Bus Bay D	12
18R	West	Franconia-Springfield Metro Station / Bus Bay D	8
S91	Loop	Franconia-Springfield Metro Station / Bus Bay D	7
S80	Loop	Spring Mall Drive / Junction Blvd	7
S91	Loop	Spring Mall Drive / Junction Blvd	7
S91	Loop	Spring Mall Drive / Junction Blvd	6
S80	Loop	Loisdale Ct / #6564	5
S80	Loop	Loisdale Ct / #6560	5
S80	Loop	Spring Mall Drive / Junction Blvd	5
S80	Loop	Loisdale Ct / #6551	5
S80	Loop	Loisdale Ct / Franconia Rd	5
18R	East	Franconia-Springfield Metro Station / Bus Bay D	4
18S	East	Franconia-Springfield Metro Station / Bus Bay D	3
S80	Loop	Springfield Mall	2

Source: WMATA (2014d)

3.4.4 Bus: Intercity

Currently, Greyhound Express commuter bus service serves the Franconia-Springfield Metro Station at the street-level bus loop. From this location, passengers can board buses that travel the I-95 corridor in both directions (i.e., southbound toward Richmond, Virginia, and northbound towards Washington, D.C.; Baltimore, Maryland; Philadelphia, Pennsylvania; and New York, New York). Service is provided seven days per week (Greyhound n.d.).

3.4.5 Bus: Commuter

There are no bus routes serving the Springfield study area that operate with commuter bus characteristics. The PRTC P-MD route, while called a commuter bus route on the agency's website (PRTC n.d.), is more like a local feeder bus in nature because it operates continuously all day and on Saturdays, unlike commuter buses that typically only run during the peak-hour and peak direction only. For more details on the PRTC P-MD route, see Sections 3.4.3 and 3.4.3.1.

3.4.6 Shuttles

Currently, the Department of Defense (DOD) operates an employee shuttle between the Franconia-Springfield Metro Station and the Mark Center, a DOD facility in Alexandria, Virginia. The shuttle operates during peak periods only with a 15-minute headway. The shuttle is only available to employees or contractors with a Common Access Card (City of Alexandria 2014). Additionally, at least one nearby residential community, Springfield Crossing, currently offers a shuttle to/from the Franconia-Springfield Metro Station (Kettler n.d.).

3.4.7 Ridesharing

3.4.7.1 Slugging

According to slug-lines.com (2014), there are existing "slug lines" in proximity to the study area. Slugging is a casual unplanned carpool system where drivers pick up riders at parking lots on their way to a shared destination allowing all users to take advantage of the time savings afforded by using HOV or HOT lanes. The closest lines operate along I-395, with designated pick-up areas in Fairfax County and Prince William County, and drop-off locations in downtown Washington, D.C.

3.4.7.2 Park and Ride Facilities

A number of Park and Ride lots serve the Springfield, Virginia area. These sites are popular for ride-sharing and slugging because of their proximity and access to the HOV/Express Lanes on I-95. Table 3-20 summarizes these locations. All routes are served by Fairfax Connector routes and collectively have approximately 3,600 spaces.

Table 3-20: Springfield Park and Ride Facilities

Name	Location	Fairfax Connector Routes	Parking Spaces			Bike Facility		Maintained by
			Fairfax County	VDOT		Racks	Lockers	
				Total	Handicap			
Backlick Road North	6831 Backlick Road Springfield, VA	310, 394, 395	264	268	7	Yes	Yes	VDOT
Backlick Road VRE	6900 Hechinger Drive Springfield, VA	321, 322, 401, 402	220	212	5	Yes	No	Fairfax County
Old Keene Mill Road	7039 Old Keene Mill Road Springfield, VA	301	278	269	8	Yes	No	Fairfax County
Springfield Mall	6716 Frontier Drive Springfield, VA	310, 321, 322, 333, 334, 401, 402	500	574	3	No	No	Springfield Mall
Saratoga	Fairfax County Parkway/Barta Road Springfield, Virginia	333, 393, 394, 494	500	500	-	No	Yes (10)	VDOT

Source: (Fairfax County 2015d; VDOT 2015b)

The Backlick Road North Park and Ride is located at 6831 Backlick Road in Springfield, Virginia, at the intersection of Backlick Road and Franconia-Springfield Parkway. The lot is served by Fairfax Connector routes 310, 394, and 395. Parking is free, and commuter parking is allowed in marked spaces. Fairfax County

Government's website states there are 264 parking spaces; however, VDOT's website states there are 268 parking spaces with seven designated handicap spaces. The lot also has bike lockers and bike racks. VDOT maintains the park and ride (Fairfax County 2015d; VDOT 2015b).

The Backlick Road VRE Park and Ride is located at 6900 Hechinger Drive in Springfield, Virginia, near the intersection of Hechinger Drive and Backlick Road. The lot is served by Fairfax Connector routes 321, 322, 401 and 402. Parking is free. Fairfax County Government's website states there are 220 parking spaces; however, VDOT's website states there are 212 parking spaces with five designated handicap spaces. The lot also has bike racks. Fairfax County maintains the park and ride (Fairfax County 2015d; VDOT 2015b).

The Old Keene Mill Road Park and Ride is located at 7039 Old Keene Mill Road in Springfield, Virginia, near the intersection of Old Keene Mill Road and Springfield Boulevard. The lot is served by Fairfax Connector route 301. Parking is free. Fairfax County Government's website states there are 278 parking spaces; however, VDOT's website states there are 269 parking spaces with eight designated handicap spaces. The lot also has bike racks. Fairfax County maintains the park and ride (Fairfax County 2015d; VDOT 2015b).

The Springfield Mall Park and Ride is located at 6716 Frontier Drive in Springfield, Virginia, near the intersection of Frontier Drive and Spring Mall Drive. The lot is served by Fairfax Connector routes 310, 321, 322, 333, 334, 401, and 402. Parking is free. Fairfax County Government's website states there are 500 parking spaces; however, VDOT's website states there are 574 parking spaces with three designated handicap spots. The lot has no bike accommodations. The Springfield Mall maintains the park and ride (Fairfax County 2015d; VDOT 2015b).

The Fairfax County Parkway / Barta Road Park and Ride, which is noted on VDOT and Fairfax County's website as the *Saratoga Park and Ride*, is located at the intersection of Fairfax County Parkway and Barta Road in Springfield, Virginia. The lot is served by Fairfax Connector routes 333, 393, 394, and 494. Parking is free. Fairfax County Government's website and VDOT's website state there are 500 parking spaces. The lot also has 10 bike lockers. VDOT maintains the park and ride (Fairfax County 2015d; VDOT 2015b).

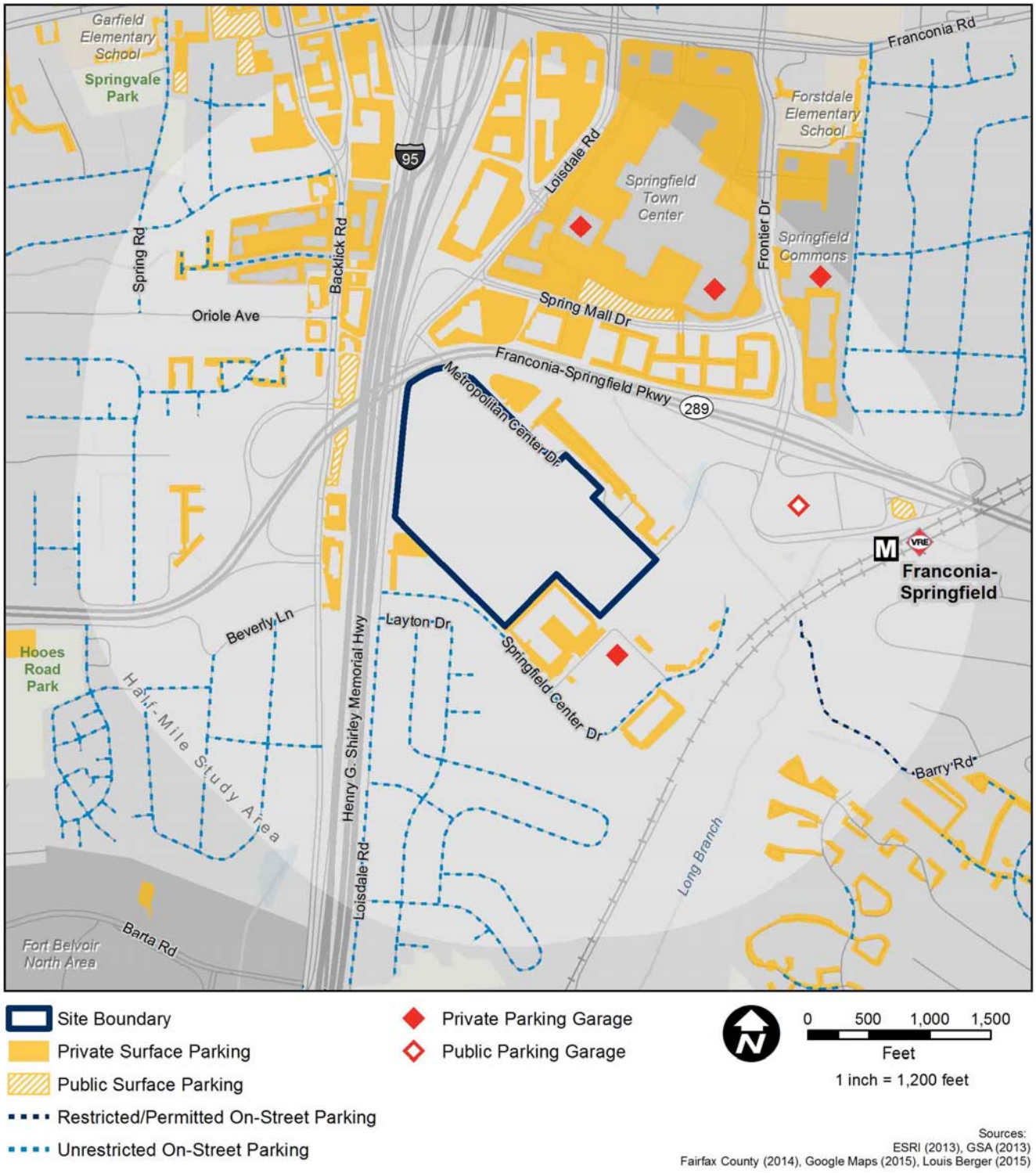
3.4.8 Carsharing

Previously, Zipcar was the only carshare company servicing the Springfield site, with one vehicle parked in the commuter garage at the Franconia-Springfield Metro Station (Zipcar 2015). Beginning on June 1, 2015, WMATA began a new partnership with Enterprise CarShare and ended its partnership with Zipcar (WMATA 2015c). Enterprise currently has two vehicles available at the Franconia-Springfield Metro Station (Enterprise 2015).

3.5 Parking

Parking near the Springfield site includes restricted and non-restricted surface lots, structured parking garages, and on-street parking, as shown in figure 3-15. On-street parking, as noted below, is limited to parallel parking in the study area and includes permit-only on-street parking and non-restricted on-street parking. Information about parking in the study area was gathered through the use of Google Maps that consisted of images from fall 2014 (https://maps.google.com), as well as onsite observations (Site Visit, May 8, 2015).

Figure 3-15: Parking in the Springfield Study Area



Within 0.5 mile of the Springfield site, there are a variety of restricted surface lots. A facility immediately adjacent and southwest of the site, on the corner of Springfield Center Drive and Loisdale Road, has approximately 135 parking spots (based on GIS analysis using Google street maps, March/April 2014, https://maps.google.com) restricted to the tenants of the facility, including DaVinci Virtual Office Solutions, Blair Inc. About 0.25-mile north of

the Springfield site, there are several thousand spots of restricted surface parking at the Springfield Town Center, intended for those who shop at the Springfield Mall and adjacent retail buildings. South of the Springfield Town Center are The Residences at Springfield Station apartments. This apartment complex is a gated community that provides several hundred parking spots to its residents, but there is no public access. Directly to the northeast and bordering the Springfield site, permit-only surface parking is available at Springfield Crossing, high-rise and garden-style apartments. Adjacent to Springfield Crossing is the Extended Stay America hotel. The hotel has approximately 110 parking spots with no visual parking restrictions; however, it is assumed that parking is intended for those using the hotel. Immediately beside the southeastern portion of the Springfield site is the Northern Virginia Community College. The college has a parking garage that has several hundred parking spots that are reserved for students of the community college and their visitors. Parking adjacent to the other businesses to the southeast of the site is restricted to tenants and visitors of the building only based on posted signs.

Directly to the west of the Springfield site, there is a Park & Ride facility, a non-restricted parking lot where drivers can leave their cars and transfer to local public transportation. The Park & Ride facility, called Backlick North and located at 6831 Backlick Road, has approximately 265 available parking spots open to the public (Commuter Connections 2015). The lot is located on the west side of I-95, but has a pedestrian bridge to connect it to the east side of I-95 where the Springfield site and the Franconia-Springfield Metro Station are located. Also due west of the Springfield site and across I-95 via the pedestrian bridge, the Springfield Masonic Lodge off of Backlick Road has approximately 80 parking spots on its lot. However, the spots are restricted for those intending to use the Masonic Lodge. Although there are several public Park & Ride lots northwest of the site, parking west of I-95 and north of Franconia-Springfield Parkway was not analyzed due to the walking distance and general inaccessibility for pedestrians; it is unlikely that FBI employees would walk to the Springfield site from that area.

A variety of structured parking is available within the vicinity of the Springfield site. There are several parking garages in the Springfield Town Center that are located about 0.5 mile away from the Springfield site; however, these garages are typically restricted for use by the customers of the surrounding malls. One of the Springfield Mall's parking garages, the Macy's parking garage located at 6717 Frontier Drive, has 500 free parking spaces open to commuters (Commuter Connections 2015). There is also a WMATA parking garage for the Metrorail and Metrobus users directly to the east of the Springfield site, located at 6880 Frontier Drive at Franconia-Springfield Parkway. The WMATA parking garage is approximately 0.5 mile from the site and has 5,069 available spots according to WMATA's website (WMATA 2015d). The Springfield Connectivity Study from 2008 includes a table of Park & Ride lots in the general study area with the average percent filled (Cambridge Systematics Inc. et al. 2008). According to that study, all of the area Park & Ride lots except for the Springfield Mall spaces were more than 90 percent full on average, with some averaging 100 percent full.

In addition to the surface lots and structured parking garages, on-street parking is present in the study area on residential streets. Loisdale Estates is approximately 0.3 mile south of the Springfield site and does not have restricted parking. East of the railroad tracks, Barry Road street parking is restricted to permitted vehicles only during the day Monday through Friday. Some residential streets immediately east of the railroad tracks and west of I-95 (Wesley Road and Oriole Avenue) do not have parking restrictions and are narrow; however, the grass and/or gravel areas alongside the roads are used for private, residential parking.

3.6 Truck Access

Trucks accessing the Springfield site currently use both the north and south vehicular entrances to/from Loisdale Road. Trucks access the site primarily during business hours, Monday through Friday, 8 AM to 6 PM. Based on correspondence with GSA staff, there do not appear to be pronounced peak truck access times (GSA 2015b).

3.7 Traffic Analysis

This section explains the tools, concepts, and definitions for analyzing the traffic operations; the process used to analyze the study area intersections; and the traffic analysis results. Although the Existing Condition presents the existing freeway mainline and ramp peak hour volumes in Section 3.7.6, the analysis for the freeways is done in the Build scenarios as agreed to by VDOT in the Springfield Site Transportation Agreement (Appendix E1).

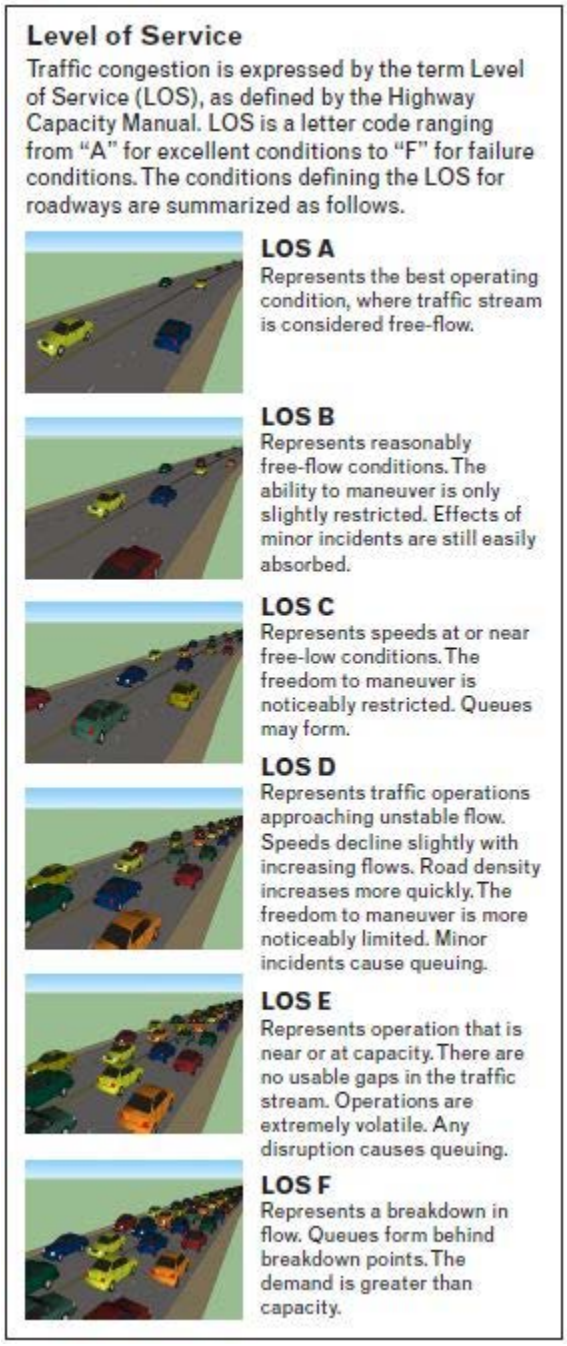
3.7.1 Analysis Tools

The study analyzed the study area intersections using Synchro™ Traffic Signal Coordination Software Version 8.0 (Build 805, Revision 878) and SimTraffic™ Version 8.0 (Build 805, Revision 878). Two main analyses are performed for traffic, an intersection capacity analysis and an intersection queueing analysis. The intersection capacity analysis uses the Synchro™ software tool and various input values as described in Section 3.7.2 to determine the LOS, or driver perception of an intersection's operation. The intersection capacity analysis determining LOS is described in Section 3.7.2, and the study area results are presented in Section 3.7.4. The intersection queuing analysis uses both the Synchro™ and SimTraffic™ tools to determine different levels of queuing, or the length that vehicles may back up at an intersection. SimTraffic was used in addition to the standard Synchro tool to analyze queueing because it provides a more robust analysis of 95th percentile queuing than Synchro and it was agreed to in the Site Transportation Agreement (Appendix E1).The intersection queuing analysis process is described more in Section 3.7.3, while the study area results of the queuing analysis are presented in Section 3.7.5.

3.7.2 Intersection Operations Analysis Method

LOS is the primary measure of traffic operations for both signalized and unsignalized intersections, as well as freeway facilities. LOS is a standard performance measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. LOS provides a scale that is intended to match the perception by motorists of the operation of the transportation facility and to provide a scale to compare different facilities. Detailed LOS descriptions are shown in figure 3-16.

Figure 3-16: Level of Service Diagram



Source: TRB (2000)

3.7.2.1 Signalized Intersection Level of Service

The LOS for signalized intersections in Virginia is based on the Highway Capacity Manual (HCM) 2000 method and requires several inputs to determine an accurate LOS (TRB 2000). Primary inputs include:

- vehicular volumes,
- pedestrian volumes,

- traffic signal timings,
- roadway geometry,
- speed limits,
- truck percentages, and
- peak hour factor (measure of vehicle 15-minute flow rate).

The average vehicle control delay, measured in seconds per vehicle, is calculated using these parameters with the Synchro procedures. This represents the average extra delay in seconds per vehicle caused by the presence of a traffic control device or traffic signal and includes the time required to decelerate, stop, and accelerate. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay is used to characterize LOS for the entire intersection or an approach. Control delay and v/c ratio are used to characterize LOS for a lane group. Delay quantifies the increase in travel time due to a traffic signal control. It is also a surrogate measure for driver discomfort and fuel consumption (TRB 2010). Signalized intersections or approaches that exceed a delay of 50 seconds have LOS E, and 80 seconds have LOS F. Table 3-21 shows the average control delay and corresponding LOS for the majority of signalized intersections in the study area. Using the HCM 2000 method, LOS E and LOS F constitute failing operations.

It is important to note that table 3-21, however, has been modified to reflect the Fairfax Comprehensive Plan guidance that LOS E be considered a passing operation for the designated Franconia-Springfield District of the Comprehensive Plan. Figure 3-17 shows this Franconia-Springfield District, which includes both the Commercial Revitalization District and the Transit Service Area, which includes the Springfield site (roughly outlined in purple and labeled with GSA) and most of the Springfield transportation study area. This Franconia-Springfield District does not include the following existing signalized study area intersections: Loisdale Road and Newington Road (Intersection #10), Loisdale Road and Fairfax County Parkway (Intersection #11), Franconia-Springfield Parkway and Spring Valley Drive (Intersection #19), I-95 HOT off-ramps to Franconia-Springfield Parkway (Intersection #20), Franconia-Springfield Parkway and Beulah Street (Intersection #21), and Franconia Road and Beulah Street (Intersection #22). For these intersections that are not included in the Comprehensive Plan district, LOS A through LOS D are considered “stable operations,” LOS E is considered “unstable conditions,” and LOS F is “above capacity and unstable conditions.”

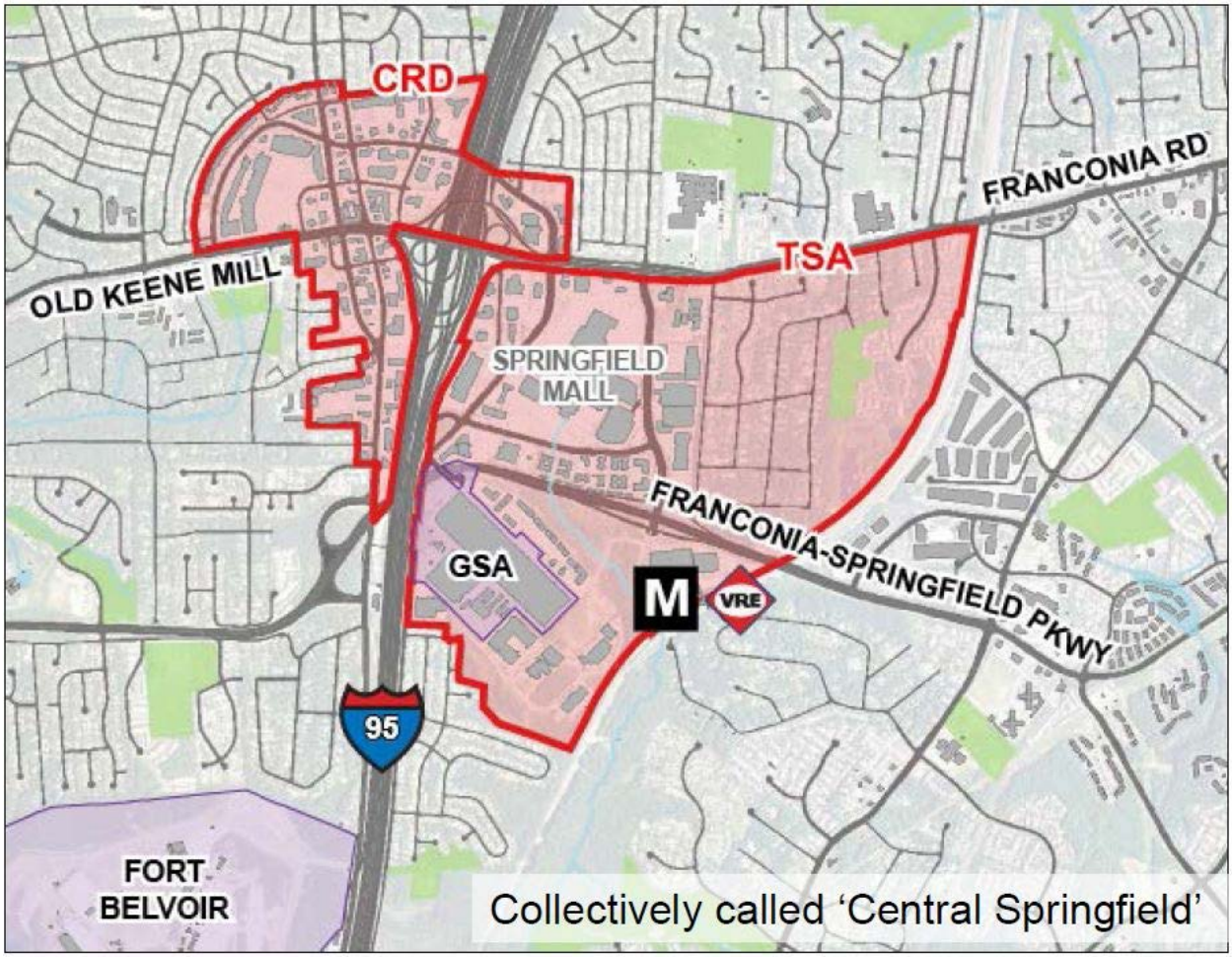
Table 3-21: Signalized Intersection Control Delay and LOS Thresholds – HCM 2000 Method

LOS	Average Control Delay (seconds/vehicle)	Description
A	Less than or equal to 10	Passing operation in the majority of the Springfield study area [a]
B	>10-20	
C	>20-35	
D	>35-55	
E	>55-80	
F	More than 80	Above capacity and unstable conditions

[a] The following study area signalized intersections do not use the above LOS guidelines, as they are outside of the designated Franconia-Springfield District as defined by the Fairfax Comprehensive Plan (see figure 3-17): #10, #11, #19, #20, #21, #22. For these intersections, LOS A through LOS D are considered “stable operations,” LOS E is considered “unstable conditions,” and LOS F is “above capacity and unstable conditions.”

Source: TRB (2000); Fairfax County (2013)

Figure 3-17: Franconia-Springfield Comprehensive Plan Area for Acceptable LOS E



Source: FC OCR (2014a)

To determine the LOS of an intersection, the critical input values were entered into the analysis software (Synchro™) and the average vehicle delay (seconds per vehicle) was calculated. Based on the average vehicle delay, the LOS was determined for all movements (left, through, and right), approaches, and the intersection as a whole. The 23 existing conditions intersections analyzed consisted of 18 signalized intersections and 5 unsignalized intersections.

3.7.2.2 Unsignalized Intersection Levels of Service

The LOS for unsignalized intersections (STOP-Controlled intersections or roundabouts) is based on the HCM 2000 method and requires several inputs to determine an accurate LOS, including:

- vehicular volumes,
- pedestrian volumes,
- roadway geometry,
- speed limits,
- truck percentages, and
- peak hour factor.

The average vehicle control delay, in seconds per vehicle, is calculated using these parameters with the HCM 2000 procedures (TRB 2000). This represents the average delay, caused by the presence of a stop sign or roundabout, and includes the time required to decelerate, stop, and accelerate.

LOS for a two-way STOP-Controlled (TWSC) intersection (i.e., unsignalized intersection) is determined for each minor-street movement (or shared movement) as well as the major-street left turns. LOS F is assigned to the movement if the v/c ratio for the movement exceeds 1.0 or if the movement's control delay exceeds 50 seconds. The LOS for TWSC intersections are different from the criteria used for signalized intersections primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also associated with more uncertainty for users because delays are less predictable than at signals, which can reduce user's delay tolerance. LOS is not defined for the TWSC intersection as a whole or for major-street approaches for three primary reasons: (a) major-street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles at a typical TWSC intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (c) the resulting low delay can mask important LOS deficiencies for minor movements (TRB 2010).

The capacity of the controlled intersection legs is based primarily on three factors: the conflicting volume, the critical gap time, defined as the number of seconds between vehicles passing the same point along the major street approach, and the follow up time, defined as the number of seconds between the departure of the first and second vehicle in queue along the minor street approach. The HCM-based capacity analysis procedure assumes consistency for driver's critical gap time. Critical gap times are based on many factors including delay experienced by drivers on the approaches controlled by STOP signs. As delay increases, drivers become less patient and will accept shorter gaps, which results in higher capacities for unsignalized intersections that are operating at LOS D or worse. The unsignalized intersection procedure uses fixed critical gap times. Unless the critical gap times are adjusted, the procedure will have a tendency to overestimate the delay at unsignalized intersections that are operating at LOS D or worse. Also, poor operations at an unsignalized intersection will encourage some drivers to turn right and make a U-turn on the mainline or accept shorter critical gaps (safety issue) rather than attempt a turn left (TRB, 2010).

Table 3-22 shows the average control delay and corresponding LOS for the majority of the unsignalized intersections in the study area. It should be noted that the worst LOS at one-way and two-way STOP-controlled intersections represents the delay for the minor approach only. Using the HCM 2000 method, LOS E and F constitute failing operations.

Like the signalized intersection LOS table, table 3-22 has been modified to reflect the Fairfax Comprehensive Plan guidance that LOS E be considered a passing operation for the designated Franconia-Springfield District of the Comprehensive Plan (figure 3-17). This Franconia-Springfield District does not include the following unsignalized study area intersections: Loisdale Road and Lois Drive (Intersection #9). For this intersection, LOS A through LOS D are considered "stable operations," LOS E is considered "unstable conditions," and LOS F is "above capacity and unstable conditions."

Table 3-22: Unsignalized Intersection Control Delay and LOS Thresholds – HCM 2000 Method

LOS	Average Control Delay (seconds/vehicle)	Description
A	Less than or equal to 10	Stable conditions [a]
B	>10-15	
C	>15-25	
D	>25-35	
E	>35-50	
F	More than 50	Above capacity and unstable conditions

[a] The following study area unsignalized intersection does not use the above LOS guidelines, as it is outside of the designated Franconia-Springfield District as defined by the Fairfax Comprehensive Plan (see figure 3-17): Intersection #9. For this intersection, LOS A through LOS D are considered "stable operations," LOS E is considered "unstable conditions," and LOS F is "above capacity and unstable conditions."

Source: Highway Capacity Manual (TRB 2000); Fairfax County (Planning Department Comprehensive Plan) 2013.

3.7.2.3 Freeway Facilities

The LOS for freeway facilities is based on the HCM 2010 procedures and requires several inputs to determine an accurate LOS (TRB 2010), including:

- vehicular volumes,
- roadway geometry,
- speed limits, and
- truck percentages.

Based on the HCM procedures, the average vehicle density, in passenger cars per mile per lane, is calculated. Table 3-23 shows the vehicle density and corresponding LOS. Freeway facilities will only be analyzed for the Build Condition; however, the existing freeway volumes will be provided in the Existing Condition and No-build Condition to allow a comparison with future freeway volumes of the proposed action or Build Condition. Using the HCM 2010 Method, LOS E and F constitute failing freeway operations. The LOS E acceptable grade within the Franconia-Springfield District defined by the Fairfax Comprehensive Plan only applies to intersection facilities.

Table 3-23: HCM Weaving Segments, Merge, and Diverge Facilities Level of Service

LOS	Density (passenger cars/mile/lane)	Description
A	Less than or equal to 10	Passing operation
B	>10-20	
C	>20-28	
D	>28-35	
E	>35	Unstable conditions
F	Demand Exceeds Capacity	Above capacity and unstable conditions

Source: TRB (2010)

3.7.3 Intersection Queuing Analysis Method

In addition to analyzing the vehicle delay, the vehicle queue lengths were calculated for each approach. The 50th percentile queue length is average queue length, calculated as the queue expected during 50 percent of the analysis period. The 95th percentile queue length is the worst-case scenario, calculated as the queue that has a 5 percent probability of being exceeded. A failing queue length is determined by a queue length exceeding the intersection approach storage capacity. Because the available storage for each intersection approach differs, these values reflect whether the existing storage provides enough space for vehicles waiting to pass through the intersection without blocking another lane or another intersection. Because failing queues might occur along the same approach as a failing LOS, these values are calculated independently and might result in one approach receiving a failing LOS score, while another approach has a failing queue length. The study used Synchro™ to calculate the 50th percentile queue lengths and SimTraffic™ to calculate 95th percentile queue lengths for the 18 signalized intersections, and only the 95th percentile queue lengths in SimTraffic™ for the five unsignalized intersections.

As noted above, SimTraffic was used to calculate the 95th percentile queue length for each approach at each study area intersection because it provides a more robust analysis than Synchro, and this tool was agreed to by the appropriate parties (Appendix E1). To be consistent with the traffic analysis for all sites, SimTraffic was used to model the 95th percentile queue lengths for all study area intersections. This involved calibrating the model, ensuring the model runs for the appropriate amount of time, and determining the number of simulation runs to be statistically within a plus or minus 5 percent error. The model was calibrated by adjusting link speeds, turning speeds, and vehicle positioning decision points (distance prior to decision point when vehicles position themselves in the correct lane for upcoming moves). The goal was to adjust the model to resemble a simulation closely representing the existing conditions. Running the model included a seeding time (time for vehicles to completely travel the network) plus four 15-minute recording times (totaling 60 minutes). Based on the distance from the farthest points on the network a 10-minute seed time was applied. The minimum number of simulation runs was calculated by running the simulation 10 runs. Based on the results of the 10 runs, the standard deviation was calculated using the vehicle hours of travel (VHT) metric. VHT provides a good indication of vehicle delays by requiring more simulations given facility operation and queuing issues. Using the calculated standard deviation, the number of simulations required was calculated to be within plus or minus 5 percent at the 95th percentile confidence level. Because SimTraffic varies quite a bit between runs in terms of VHT, even for small networks, a plus or minus 5 percent error was established. The number of simulation runs to reduce the error to 4 percent would require dozens of runs for little gain in accuracy. In some cases where little congestion occurred, 10 runs achieved better than a plus or minus 5 percent error. Appendix E5 contains the statistical Excel sheets used to determine the appropriate number of simulation runs.

3.7.4 Existing Conditions Intersection Operations Analysis

Synchro™ was used to calculate the vehicle delay and LOS operation based on the HCM 2000 method for each study area intersection.

3.7.4.1 Signalized Intersection Operations Analysis

Based on the Synchro™ signalized intersection analysis, the majority of study intersections operate at acceptable overall conditions during the morning and afternoon peak hours. However, the intersection of Franconia-Springfield Parkway/Manchester Boulevard and Beulah Street operates at LOS E (average control delay exceeds 55 seconds per vehicle) during the AM peak hour and LOS F during the PM peak hour. This is the only intersection within the study area that operates under unacceptable conditions (LOS E or LOS F, or just LOS F, depending on the location of the intersection).

Using HCM 2000, a total of 12 signalized intersection lane groups or overall approaches operate under unacceptable conditions during the morning or afternoon peak hours. The lane group within the approach that is operating at unacceptable conditions is noted in parentheses; when "overall" is noted, the overall approach movements operate under unacceptable conditions. When "overall" is noted, individual lanes or lane groups in that approach which fail, are not noted. Like the overall intersection thresholds for unacceptable conditions, those approaches of study area intersections within the Franconia-Springfield District whose approach is LOS E are acceptable and those with LOS F are unacceptable, whereas all other intersections outside this area all approaches with LOS E or LOS F are unacceptable.

- Loisdale Road/Commerce Street and Franconia Road (Westbound) (Intersection # 1)
  - Westbound Franconia Road (left turns) during both the AM and PM peak hours
- Loisdale Road/Commerce Street and Franconia Road (Eastbound) (Intersection # 2)
  - Eastbound Franconia Road (left turns) in the AM peak hour, and northbound Loisdale Road (overall) during the PM peak hour
- Loisdale Road and Hotel Entrance/Newington Road (Intersection # 10)
  - Northbound Loisdale Road (overall) during both the AM and PM peak hours
- Loisdale Road/I-95 (N) Ramp C and D and Fairfax County Parkway (Intersection # 11)
  - Eastbound I-95 northbound off-ramp (through movements), westbound Loisdale Road (overall), and southbound Fairfax County Parkway (left turns) during both the AM and PM peak hours
- Frontier Drive and Franconia Road (Westbound) (Intersection # 12)
  - Westbound Franconia Road (left turns) during the PM peak hour
- Frontier Drive and Best Buy/Springfield Mall Parking Lot Entrance (Intersection # 14)
  - Northbound Frontier Drive (left turns) in the AM peak hour and northbound Frontier Drive (left turns) and Southbound Frontier Drive (left turns) during the PM peak hour
- Frontier Drive and Home Depot/Springfield Mall Garage Entrance (Intersection # 15)
  - Northbound Frontier Drive (left turns) and southbound Frontier Drive (left turns) in both the AM and PM peak hours
- Frontier Drive and Spring Mall Drive (Intersection # 16)
  - Southbound Frontier Drive (left turns) at the intersection of Frontier Drive and Spring Mall Road during the AM peak hour, and southbound Frontier Drive (left and right turns) during the PM peak hour
- Franconia-Springfield Parkway and Spring Village Drive/Bonniemill Lane (Intersection # 19)
  - Eastbound Franconia-Springfield Parkway (left turns), westbound Franconia-Springfield Parkway (left turns), northbound Bonniemill Lane (overall), and southbound Spring Village Drive (overall) during both the AM and PM peak hours.
- Franconia-Springfield Parkway and I-95 HOT Lane Ramps (Intersection # 20)
  - Eastbound Franconia-Springfield Parkway (overall – through and right turns) and westbound Franconia-Springfield Parkway (left turns in the PM hours) during the PM peak hour.
- Franconia-Springfield Parkway/Manchester Boulevard and Beulah Street (Intersection # 21)
  - Eastbound Franconia-Springfield Parkway (left turns), westbound Manchester Boulevard (overall), and northbound and southbound Beulah Street (both overall) during the AM peak hour
  - Eastbound Franconia-Springfield Parkway (overall), westbound Manchester Boulevard (overall), and northbound and southbound Beulah Street (both overall) at the same intersection during the PM peak hour
- Franconia Road and Beulah Street (Intersection # 22)
  - Northbound Beulah Street (left and through movements) and southbound development driveway exit (overall) during the AM peak hour
  - Eastbound Franconia Road (overall), northbound Beulah Street (left and through movements), and southbound development driveway exit (overall) during the PM peak hour

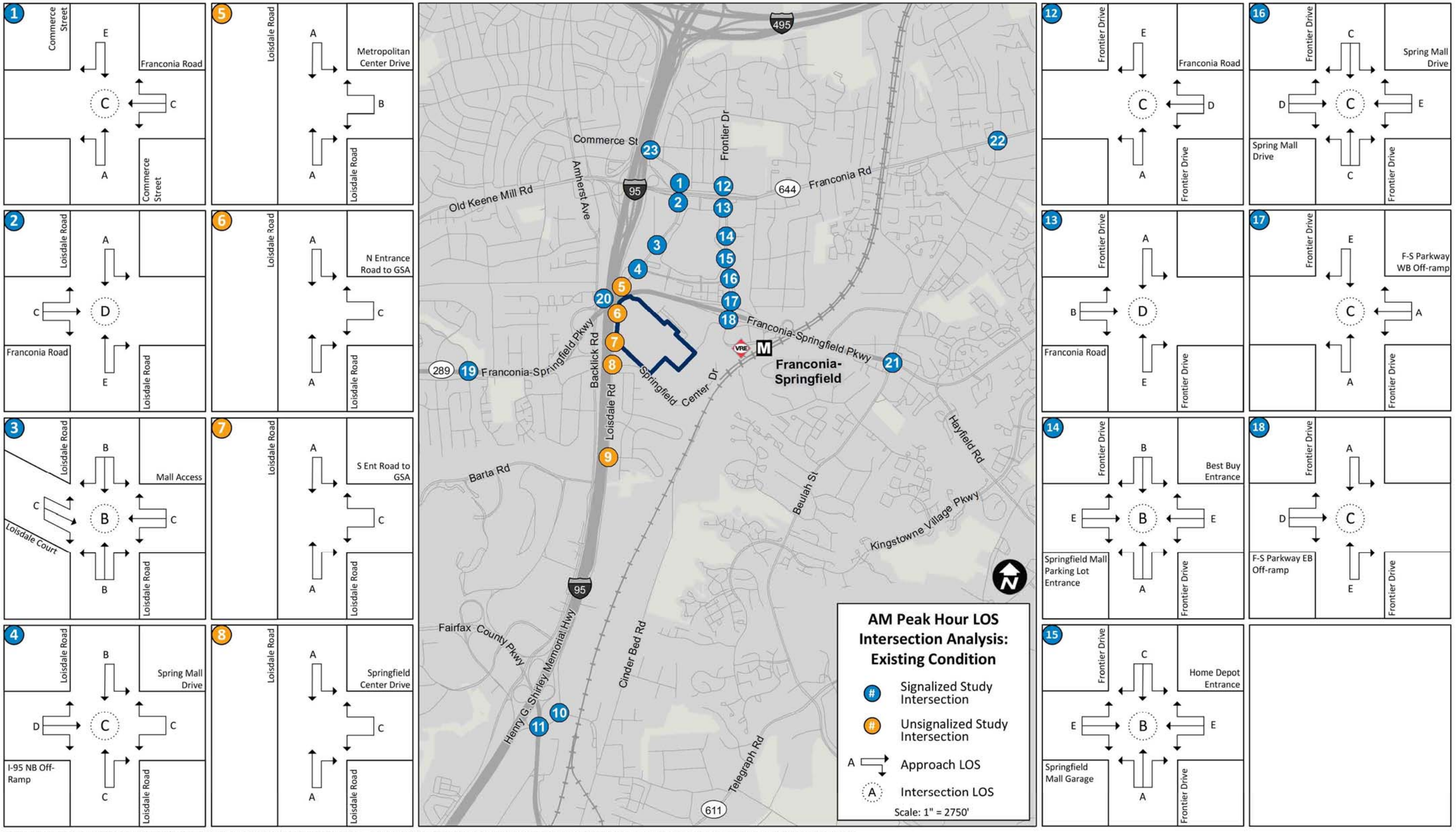
3.7.4.2 Unsignalized Intersection Operations Analysis

Based on the unsignalized intersection analysis, all of the unsignalized intersections and approaches in the study area operate at acceptable conditions during the AM and PM peak hours.

3.7.4.3 Complete Intersection Operations Analysis

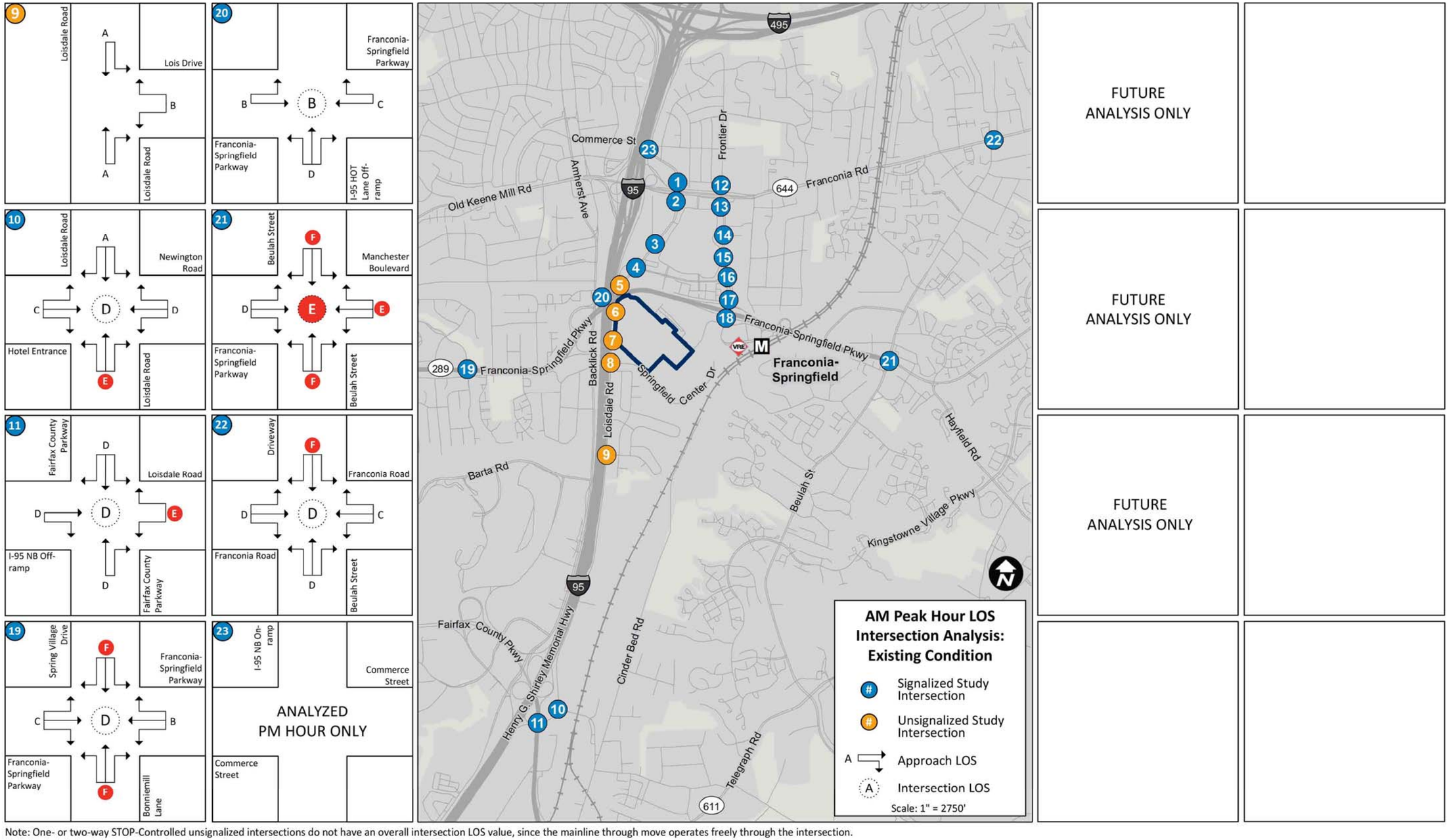
The average LOS for the various approaches to the intersection and the overall intersection LOS grade are depicted in figures 3-18 and 3-19 for AM and PM peak hours, respectively. Table 3-24 shows the results of the LOS capacity analysis and the intersection vehicle delay for the existing conditions during the AM and PM peak hours.

Figure 3-18: Existing Conditions Intersection LOS for AM Peak Hour



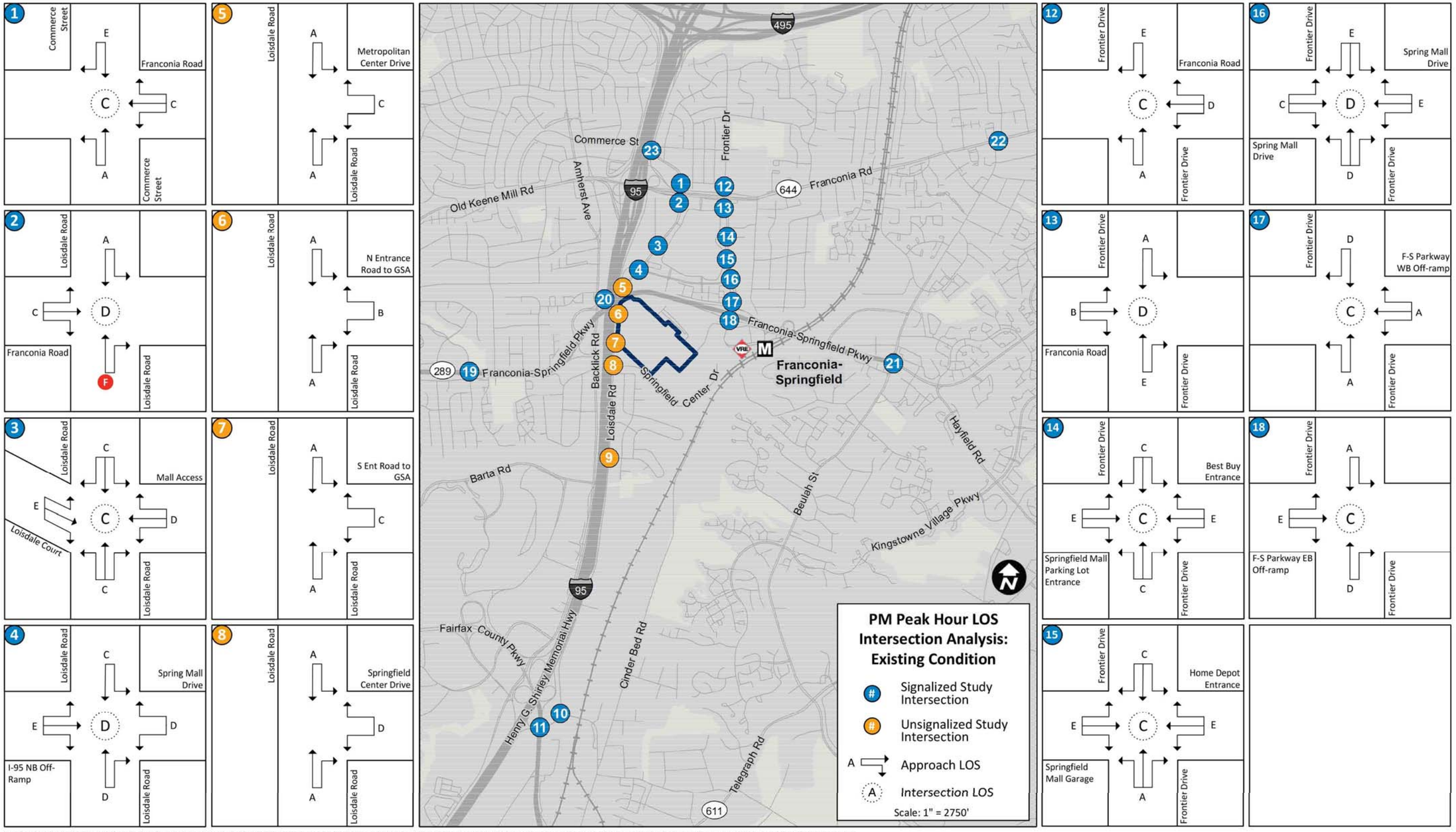
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Figure 3-18: Existing Conditions Intersection LOS for AM Peak Hour (continued)



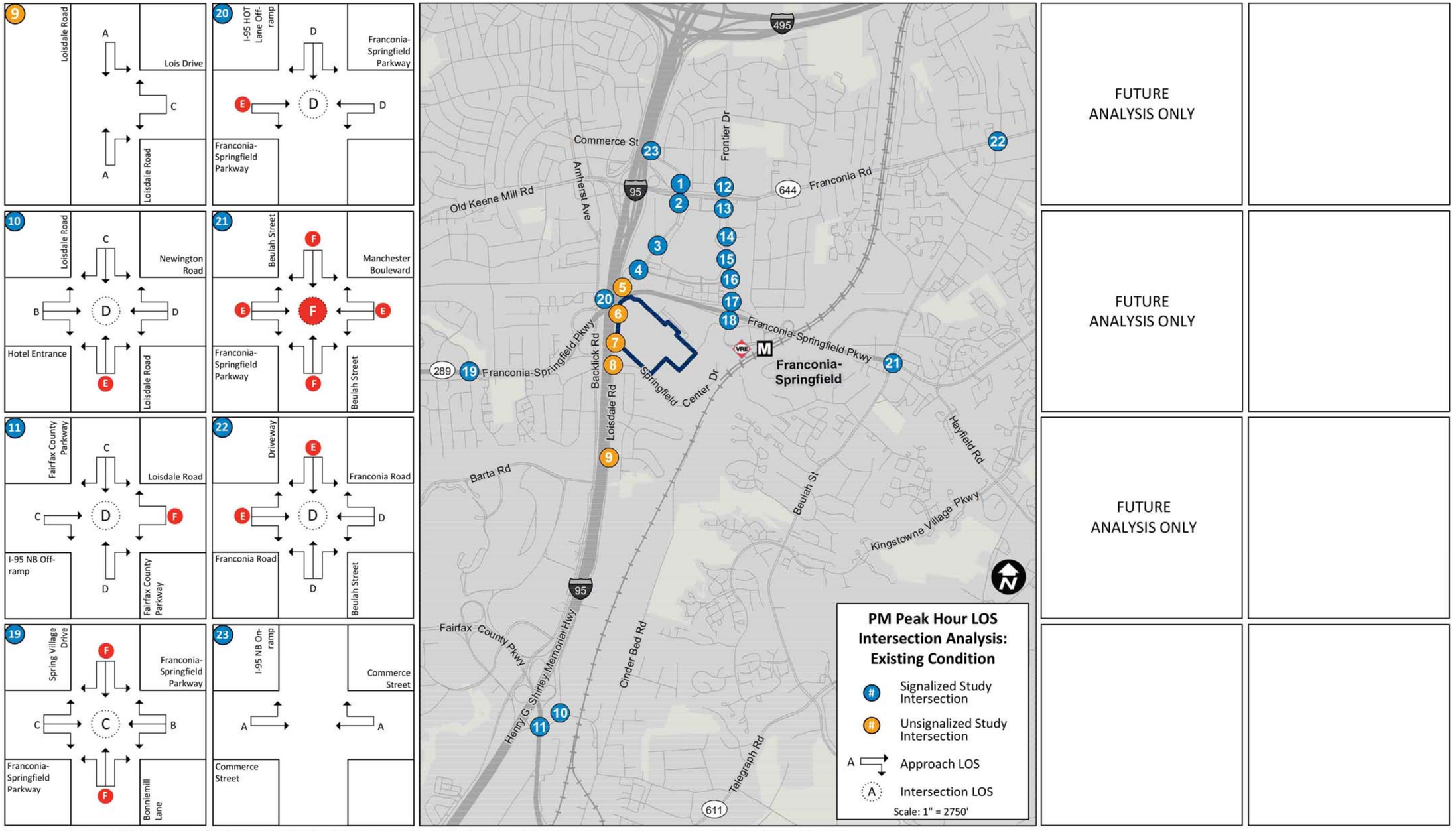
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Figure 3-19: Existing Conditions Intersection LOS for PM Peak Hour



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Figure 3-19: Existing Conditions Intersection LOS for PM Peak Hour (continued)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
1	**Loisdale Road/Commerce Street & Franconia Road (Westbound) (Signalized)**							
	WB (Franconia Rd)	L	97.5	F		121.0	F	
	WB (Franconia Rd)	T	29.6	C		42.8	D	
	WB (Franconia Rd)	R	1.3	A		0.8	A	
	WB Overall (Franconia Rd)		**20.7**	**C**		**33.4**	**C**	
	NB (Commerce St)	L	0.2	A		5.1	A	
	NB (Commerce St)	LT	1.5	A		4.8	A	
	NB Overall (Commerce St)		**0.9**	**A**		**5.0**	**A**	
	SB (Commerce St)	T	71.0	E		64.1	E	
	SB (Commerce St)	R	68.1	E		59.1	E	
	SB Overall (Commerce St)		**69.8**	**E**		**62.7**	**E**	
	Overall		**24.0**	**C**	**Pass**	**33.2**	**C**	**Pass**
2	**Loisdale Road/Commerce Street & Franconia Road (Eastbound) (Signalized)**							
	EB (Franconia Rd)	L	113.1	F		70.4	E	
	EB (Franconia Rd)	T	40.7	D		55.4	E	
	EB (Franconia Rd)	R	0.6	A		3.2	A	
	EB Overall (Franconia Rd)		**28.1**	**C**		**21.5**	**C**	
	NB (Loisdale Rd)	T	66.8	E		89.6	F	
	NB (Loisdale Rd)	R	58.9	E		55.2	E	
	NB Overall (Loisdale Rd)		**65.1**	**E**		**84.3**	**F**	
	SB (Loisdale Rd)	L	2.6	A		0.2	A	
	SB (Loisdale Rd)	T	2.6	A		0.1	A	
	SB Overall (Loisdale Rd)		**2.6**	**A**		**0.2**	**A**	
	Overall		**37.4**	**D**	**Pass**	**36.7**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
3	**Loisdale Road & Loisdale Court/Mall Access (Signalized)**							
	EB (Loisdale Court)	L	26.8	C		77.4	E	
	EB (Loisdale Court)	TR	23.8	C		46.2	D	
	EB Overall (Loisdale Court)		**25.8**	**C**		**65.1**	**E**	
	WB (Mall Access)	L	23.9	C		49.2	D	
	WB (Mall Access)	T	23.8	C		44.4	D	
	WB (Mall Access)	R	23.6	C		44.8	D	
	WB Overall (Mall Access)		**23.7**	**C**		**46.3**	**D**	
	NB (Loisdale Rd)	L	6.1	A		36.9	D	
	NB (Loisdale Rd)	T	13.0	B		30.5	C	
	NB (Loisdale Rd)	R	0.0	A		0.0	A	
	NB Overall (Loisdale Rd)		**11.8**	**B**		**29.2**	**C**	
	SB (Loisdale Rd)	L	9.0	A		27.4	C	
	SB (Loisdale Rd)	T	13.9	B		25.5	C	
	SB (Loisdale Rd)	R	11.7	B		15.5	B	
	SB Overall (Loisdale Rd)		**13.0**	**B**		**25.4**	**C**	
	Overall		**13.4**	**B**	**Pass**	**33.2**	**C**	**Pass**
4	**Loisdale Road & Ramp from NB I-95/Spring Mall Drive (Signalized)**							
	EB (Ramp from NB I-95)	L	36.8	D		74.6	E	
	EB (Ramp from NB I-95)	LT	35.6	D		68.2	E	
	EB (Ramp from NB I-95)	R	30.6	C		57.7	E	
	EB Overall (Ramp from NB I-95)		**35.5**	**D**		**70.1**	**E**	
	WB (Spring Mall Dr)	L	39.3	D		69.0	E	
	WB (Spring Mall Dr)	R	28.2	C		31.1	C	
	WB Overall (Spring Mall Dr)		**33.7**	**C**		**49.9**	**D**	
	NB (Loisdale Rd)	TR	31.6	C		46.8	D	
	NB (Loisdale Rd)	R	25.7	C		38.4	D	
	NB Overall (Loisdale Rd)		**30.3**	**C**		**45.1**	**D**	
	SB (Loisdale Rd)	L	17.0	B		51.8	D	
	SB (Loisdale Rd)	T	15.1	B		6.8	A	
	SB Overall (Loisdale Rd)		**15.6**	**B**		**24.9**	**C**	
	Overall		**28.3**	**C**	**Pass**	**39.3**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
5	**Loisdale Road & Metropolitan Center Drive (TWSC)**							
	WB (Metropolitan Center Dr)	L	25.5	D		40.6	E	
	WB (Metropolitan Center Dr)	R	12.6	B		10.8	B	
	WB Overall (Metropolitan Center Dr)		**13.8**	**B**		**16.5**	**C**	
	SB (Loisdale Rd)	L	9.6	A		9.5	A	
	SB Overall (Loisdale Rd)		**0.7**	**-**		**1.4**	**-**	
	Overall		**-**	**-**	**Pass**	**-**	**-**	**Pass**
6	**Loisdale Road & Northern Entrance Road to GSA Facility (Access to Building A, 66808 & 6610 Loisdale Road) (TWSC)**							
	WB (N Ent Rd to GSA)	L	26.9	D		0.0	A	
	WB (N Ent Rd to GSA)	R	12.7	B		12.3	B	
	WB Overall (N Ent Rd to GSA)		**15.1**	**C**		**12.3**	**B**	
	SB (Loisdale Rd)	L	9.0	A		8.7	A	
	SB Overall (Loisdale Rd)		**0.5**	**-**		**0.0**	**-**	
	Overall		**-**	**-**	**Pass**	**-**	**-**	**Pass**
7	**Loisdale Road & Southern Entrance Road to GSA Facility (Access to Building B, 7000 Loisdale Road) (TWSC)**							
	WB (S Ent Rd to GSA)	L	36.3	E		33.8	D	
	WB (S Ent Rd to GSA)	R	13.3	B		11.3	B	
	WB Overall (S Ent Rd to GSA)		**17.6**	**C**		**16.3**	**C**	
	SB (Loisdale Rd)	L	9.5	A		8.2	A	
	SB Overall (Loisdale Rd)		**1.9**	**-**		**0.1**	**-**	
	Overall		**-**	**-**	**Pass**	**-**	**-**	**Pass**
8	**Loisdale Road & Springfield Center Drive (TWSC)**							
	WB (Springfield Center Dr)	LR	18.6	C		29.0	D	
	WB Overall (Springfield Center Dr)		**18.6**	**C**		**29.0**	**D**	
	SB (Loisdale Rd)	L	9.7	A		8.5	A	
	SB Overall (Loisdale Rd)		**2.5**	**-**		**0.5**	**-**	
	Overall		**-**	**-**	**Pass**	**-**	**-**	**Pass**
9	**Loisdale Road & Lois Drive (TWSC)**							
	WB (Lois Drive Dr)	LR	13.2	B		18.9	C	
	WB Overall (Lois Drive Dr)		**13.2**	**B**	**Pass**	**18.9**	**C**	**Pass**
	SB (Loisdale Rd)	L	8.4	A		8.2	A	
	SB Overall (Loisdale Rd)		**0.3**	**-**	**Pass**	**0.2**	**-**	**Pass**
	Overall		**-**	**-**	**Pass**	**-**	**-**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
10	**Loisdale Road & Hotel Entrance/Newington Road (Signalized)**							
	EB (Hotel Entrance)	LTR	30.1	C		16.7	B	
	EB Overall (Hotel Entrance)		**30.1**	**C**	**Pass**	**16.7**	**B**	**Pass**
	WB (Newington Rd)	LT	45.4	D		51.9	D	
	WB (Newington Rd)	R	30.6	C		17.0	B	
	WB Overall (Newington Rd)		**39.3**	**D**	**Pass**	**44.5**	**D**	**Pass**
	NB (Loisdale Rd)	L	18.9	B		32.7	C	
	NB (Loisdale Rd)	T	24.1	C		35.0	C	
	NB (Loisdale Rd)	R	109.1	F		132.1	F	
	NB Overall (Loisdale Rd)		**61.0**	**E**	**Fail**	**70.5**	**E**	**Fail**
	SB (Loisdale Rd)	L	7.4	A		21.9	C	
	SB (Loisdale Rd)	T	9.0	A		25.4	C	
	SB (Loisdale Rd)	R	8.5	A		19.4	B	
	SB Overall (Loisdale Rd)		**8.3**	**A**	**Pass**	**24.2**	**C**	**Pass**
	Overall		**42.9**	**D**	**Pass**	**39.5**	**D**	**Pass**
11	**Loisdale Road/I-95 (N) Ramp C & D & Fairfax County Parkway (Signalized)**							
	EB (I-95 Northbound Off-Ramp)	T	97.5	F		82.5	F	
	EB (I-95 Northbound Off-Ramp)	R	0.3	A		0.2	A	
	EB Overall (I-95 Northbound Off-Ramp)		**39.2**	**D**	**Pass**	**23.3**	**C**	**Pass**
	WB (Loisdale Rd)	L	164.7	F		319.1	F	
	WB (Loisdale Rd)	R	30.9	C		42.1	D	
	WB Overall (Loisdale Rd)		**72.8**	**E**	**Fail**	**123.1**	**F**	**Fail**
	NB (Fairfax County Pkwy)	TR	35.1	D		40.2	D	
	NB Overall (Fairfax County Pkwy)		**35.1**	**D**	**Pass**	**40.2**	**D**	**Pass**
	SB (Fairfax County Pkwy)	L	120.9	F		157.0	F	
	SB (Fairfax County Pkwy)	T	42.4	D		14.0	B	
	SB (Fairfax County Pkwy)	R	0.8	A		0.9	A	
	SB Overall (Fairfax County Pkwy)		**41.3**	**D**	**Pass**	**26.0**	**C**	**Pass**
	Overall		**41.7**	**D**	**Pass**	**49.9**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
12	**Frontier Drive & Franconia Road (Westbound) (Signalized)**							
	WB (Franconia Rd)	L	74.7	E		84.5	F	
	WB (Franconia Rd)	TR	42.5	D		26.8	C	
	WB Overall (Franconia Rd)		**46.8**	**D**		**38.2**	**D**	
	NB (Frontier Dr)	L	7.8	A		5.2	A	
	NB (Frontier Dr)	T	4.4	A		1.2	A	
	NB Overall (Frontier Dr)		**7.6**	**A**		**4.7**	**A**	
	SB (Frontier Dr)	TR	73.8	E		66.3	E	
	SB Overall (Frontier Dr)		**73.8**	**E**		**66.3**	**E**	
	Overall		**30.4**	**C**	**Pass**	**24.2**	**C**	**Pass**
13	**Frontier Drive & Franconia Road (Eastbound) (Signalized)**							
	EB (Franconia Rd)	L	52.8	D		54.2	D	
	EB (Franconia Rd)	T	26.0	C		27.0	C	
	EB (Franconia Rd)	R	0.5	A		0.5	A	
	EB Overall (Franconia Rd)		**13.2**	**B**		**17.0**	**B**	
	NB (Frontier Dr)	T	63.8	E		63.5	E	
	NB (Frontier Dr)	R	54.0	D		72.0	E	
	NB Overall (Frontier Dr)		**62.0**	**E**		**65.5**	**E**	
	SB (Frontier Dr)	LT	2.1	A		2.1	A	
	SB Overall (Frontier Dr)		**2.1**	**A**		**2.1**	**A**	
	Overall		**37.1**	**D**	**Pass**	**38.3**	**D**	**Pass**
14	**Frontier Drive & Best Buy/Springfield Mall Lot Entrance (Signalized)**							
	EB (Springfield Mall Lot Ent)	L	71.1	E		79.1	E	
	EB (Springfield Mall Lot Ent)	LTR	70.7	E		68.1	E	
	EB Overall (Springfield Mall Parking Lot Ent)		**70.8**	**E**		**73.0**	**E**	
	WB (Best Buy Ent)	L	73.4	E		77.7	E	
	WB (Best Buy Ent)	TR	66.9	E		67.4	E	
	WB Overall (Best Buy Ent)		**71.3**	**E**		**72.3**	**E**	
	NB (Frontier Dr)	L	92.9	F		106.4	F	
	NB (Frontier Dr)	T	4.4	A		9.2	A	
	NB (Frontier Dr)	R	8.9	A		0.7	A	
	NB Overall (Frontier Dr)		**7.8**	**A**		**20.2**	**C**	
	SB (Frontier Dr)	L	73.3	E		81.5	F	
	SB (Frontier Dr)	T	9.8	A		13.7	B	
	SB (Frontier Dr)	R	8.8	A		31.7	C	
	SB Overall (Frontier Dr)		**14.6**	**B**		**26.9**	**C**	
	Overall		**13.7**	**B**	**Pass**	**32.7**	**C**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
15	**Frontier Drive & Home Depot/Springfield Mall Garage Entrance (Signalized)**							
	EB (Springfield Mall Garage Ent)	LT	77.8	E		76.8	E	
	EB (Springfield Mall Garage Ent)	R	73.8	E		73.9	E	
	EB Overall (Springfield Mall Garage Ent)		**75.1**	**E**		**74.8**	**E**	
	WB (Home Depot Ent)	LTR	73.5	E		75.8	E	
	WB Overall (Home Depot Ent)		**73.5**	**E**		**75.8**	**E**	
	NB (Frontier Dr)	L	116.7	F		89.0	F	
	NB (Frontier Dr)	T	6.9	A		5.8	A	
	NB (Frontier Dr)	R	4.1	A		7.8	A	
	NB Overall (Frontier Dr)		**7.5**	**A**		**7.4**	**A**	
	SB (Frontier Dr)	L	90.0	F		96.4	F	
	SB (Frontier Dr)	T	4.9	A		6.8	A	
	SB (Frontier Dr)	R	0.0	A		0.0	A	
	SB Overall (Frontier Dr)		**20.5**	**C**		**24.2**	**C**	
	Overall		**16.8**	**B**	**Pass**	**22.4**	**C**	**Pass**
16	**Frontier Drive & Spring Mall Drive (Signalized)**							
	EB (Spring Mall Dr)	L	64.6	E		59.3	E	
	EB (Spring Mall Dr)	LT	64.7	E		59.3	E	
	EB (Spring Mall Dr)	R	28.2	C		28.2	C	
	EB Overall (Spring Mall Dr)		**36.8**	**D**		**33.8**	**C**	
	WB (Spring Mall Dr)	LT	71.5	E		77.5	E	
	WB (Spring Mall Dr)	R	63.5	E		56.3	E	
	WB Overall (Spring Mall Dr)		**68.2**	**E**		**69.9**	**E**	
	NB (Frontier Dr)	L	73.0	E		78.1	E	
	NB (Frontier Dr)	T	13.8	B		21.1	C	
	NB (Frontier Dr)	R	10.6	B		22.8	C	
	NB Overall (Frontier Dr)		**28.6**	**C**		**39.3**	**D**	
	SB (Frontier Dr)	L	87.3	F		96.5	F	
	SB (Frontier Dr)	T	22.1	C		37.7	D	
	SB (Frontier Dr)	R	27.6	C		199.3	F	
	SB Overall (Frontier Dr)		**25.5**	**C**		**64.3**	**E**	
	Overall		**30.5**	**C**	**Pass**	**45.0**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
17	**Frontier Drive & Franconia-Springfield Parkway (Westbound) (Signalized)**							
	WB (F-S Pkwy WB Off-ramp)	L	73.6	E		75.5	E	
	WB (F-S Pkwy WB Off-ramp)	LT	73.3	E		75.5	E	
	WB (F-S Pkwy WB Off-ramp)	R	1.1	A		1.3	A	
	WB Overall (F-S Pkwy WB Off-ramp)		**3.7**	**A**		**3.2**	**A**	
	NB (Frontier Dr)	L	1.9	A		1.8	A	
	NB (Frontier Dr)	T	2.2	A		1.8	A	
	NB Overall (Frontier Dr)		**2.2**	**A**		**1.8**	**A**	
	SB (Frontier Dr)	T	59.8	E		39.8	D	
	SB (Frontier Dr)	R	52.9	D		55.7	E	
	SB Overall (Frontier Dr)		**58.7**	**E**		**46.5**	**D**	
	Overall		**23.3**	**C**	**Pass**	**21.1**	**C**	**Pass**
18	**Frontier Drive & Franconia-Springfield Parkway (Eastbound) (Signalized)**							
	EB (F-S Pkwy EB Off-ramp)	L	31.1	C		72.0	E	
	EB (F-S Pkwy EB Off-ramp)	LT	31.1	C		72.6	E	
	EB (F-S Pkwy EB Off-ramp)	R	51.8	D		59.9	E	
	EB Overall (F-S Pkwy EB Off-ramp)		**43.4**	**D**		**67.8**	**E**	
	NB (Frontier Dr)	TR	58.1	E		39.5	D	
	NB Overall (Frontier Dr)		**58.1**	**E**		**39.5**	**D**	
	SB (Frontier Dr)	L	3.2	A		4.6	A	
	SB (Frontier Dr)	T	3.5	A		1.3	A	
	SB Overall (Frontier Dr)		**3.4**	**A**		**3.6**	**A**	
	Overall		**33.2**	**C**	**Pass**	**33.4**	**C**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
19	**Franconia-Springfield Parkway & Spring Village Drive/Bonniemill Lane (Signalized)**							
	EB (Franconia-Springfield Pkwy)	L	150.9	F		107.3	F	
	EB (Franconia-Springfield Pkwy)	T	33.3	C		21.2	C	
	EB (Franconia-Springfield Pkwy)	R	6.6	A		16.2	B	
	EB Overall (Franconia-Springfield Pkwy)		**34.4**	**C**	**Pass**	**23.0**	**C**	**Pass**
	WB (Franconia-Springfield Pkwy)	L	167.1	F		91.0	F	
	WB (Franconia-Springfield Pkwy)	T	7.7	A		16.1	B	
	WB (Franconia-Springfield Pkwy)	R	6.8	A		5.8	A	
	WB Overall (Franconia-Springfield Pkwy)		**15.3**	**B**	**Pass**	**19.9**	**B**	**Pass**
	NB (Bonniemill Ln)	L	123.5	F		91.0	F	
	NB (Bonniemill Ln)	T	121.5	F		90.1	F	
	NB (Bonniemill Ln)	R	162.6	F		90.6	F	
	NB Overall (Bonniemill Ln)		**158.0**	**F**	**Fail**	**90.6**	**F**	**Fail**
	SB (Spring Village Dr)	L	165.0	F		174.6	F	
	SB (Spring Village Dr)	T	121.5	F		90.4	F	
	SB (Spring Village Dr)	R	121.7	F		90.6	F	
	SB Overall (Spring Village Dr)		**150.9**	**F**	**Fail**	**141.4**	**F**	**Fail**
	Overall		**39.0**	**D**	**Pass**	**27.4**	**C**	**Pass**
20	**Franconia-Springfield Parkway & I-95 HOT Lane Ramps (Signalized)[a]**							
	EB (Franconia-Springfield Pkwy)	L (AM)	38.3	D		-	-	
	EB (Franconia-Springfield Pkwy)	T	9.1	A		64.0	E	
	EB (Franconia-Springfield Pkwy)	R (PM)	-	-		42.7	D	
	EB Overall (Franconia-Springfield Pkwy)		**13.2**	**B**	**Pass**	**63.5**	**E**	**Fail**
	WB (Franconia-Springfield Pkwy)	L (PM)	-	-		78.1	E	
	WB (Franconia-Springfield Pkwy)	T	29.8	C		45.1	D	
	WB (Franconia-Springfield Pkwy)	R (AM)	24.2	C		-	-	
	WB Overall (Franconia-Springfield Pkwy)		**28.9**	**C**	**Pass**	**47.6**	**D**	**Pass**
	NB (I-95 HOT Lane Off-ramp)	LTR (AM)	42.9	D		-	-	
	NB Overall (I-95 HOT Lane Off-ramp)		**42.9**	**D**	**Pass**	**-**	**-**	**Pass**
	SB (I-95 HOT Lane Off-ramp)	LTR (PM)	-	-		53.8	D	
	SB Overall (I-95 HOT Lane Off-ramp)		**-**	**-**		**53.8**	**D**	
	Overall		**19.2**	**B**	**Pass**	**52.8**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
21	**Franconia-Springfield Parkway/Manchester Boulevard & Beulah Street (Signalized)**							
	EB (Franconia-Springfield Pkwy)	L	86.8	F		50.2	D	
	EB (Franconia-Springfield Pkwy)	T	35.7	D		56.8	E	
	EB (Franconia-Springfield Pkwy)	R	32.9	C		71.5	E	
	EB Overall (Franconia-Springfield Pkwy)		**50.0**	**D**	**Pass**	**60.3**	**E**	**Fail**
	WB (Manchester Blvd)	L	78.2	E		111.1	F	
	WB (Manchester Blvd)	T	58.3	E		65.0	E	
	WB (Manchester Blvd)	R	37.9	D		36.1	D	
	WB Overall (Manchester Blvd)		**56.4**	**E**	**Fail**	**65.9**	**E**	**Fail**
	NB (Beulah St)	L	151.7	F		185.2	F	
	NB (Beulah St)	T	64.6	E		78.6	E	
	NB (Beulah St)	R	48.2	D		63.2	E	
	NB Overall (Beulah St)		**109.8**	**F**	**Fail**	**129.8**	**F**	**Fail**
	SB (Beulah St)	L	74.1	E		89.4	F	
	SB (Beulah St)	T	175.5	F		164.3	F	
	SB (Beulah St)	R	73.0	E		76.7	E	
	SB Overall (Beulah St)		**119.8**	**F**	**Fail**	**119.0**	**F**	**Fail**
	Overall		**77.7**	**E**	**Fail**	**86.5**	**F**	**Fail**
22	**Franconia Road & Beulah Street (Signalized)**							
	EB (Franconia Rd)	L	30.7	C		46.4	D	
	EB (Franconia Rd)	TR	35.7	D		66.8	E	
	EB Overall (Franconia Rd)		**35.7**	**D**	**Pass**	**66.7**	**E**	**Fail**
	WB (Franconia Rd)	L	54.7	D		74.5	E	
	WB (Franconia Rd)	TR	14.9	B		15.3	B	
	WB Overall (Franconia Rd)		**33.1**	**C**	**Pass**	**38.2**	**D**	**Pass**
	NB (Beulah St)	LT	58.7	E		88.0	F	
	NB (Beulah St)	R	42.5	D		26.8	C	
	NB Overall (Beulah St)		**44.8**	**D**	**Pass**	**45.6**	**D**	**Pass**
	SB (Driveway)	LTR	97.9	F		77.7	E	
	SB Overall (Driveway)		**97.9**	**F**	**Fail**	**77.7**	**E**	**Fail**
	Overall		**37.5**	**D**	**Pass**	**49.4**	**D**	**Pass**

Table 3-24: Existing Conditions AM and PM Peak Hour Operations Analysis (continued)

#	Intersection and Approach	Lane Group	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Check	Delay (sec/veh)	LOS	Check
23	**I-95 NB On-ramp & Commerce Street (Signalized)** [b]							
	EB (Commerce St)	L	-	-		1.7	A	
	EB (Commerce St)	T	-	-		0.1	A	
	EB Overall (Commerce St)		**-**	**-**		**0.2**	**A**	
	WB (Commerce St)	T	-	-		6.6	A	
	WB (Commerce St)	R	-	-		5.9	A	
	WB Overall (Commerce St)		**-**	**-**		**6.4**	**A**	
	Overall		**-**	**-**	**-**	**3.0**	**A**	**Pass**

Notes:

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LOS = Level of Service

LTR = left / through / right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection (TWSC intersections do not have an overall LOS)

Delay is Measured in Seconds Per Vehicle.

Red cells denote intersections or approaches operating at unacceptable conditions.

[a] Intersection operates with a different lane configuration during the AM and PM peak hours.

[b] Intersection is not analyzed during the AM peak hour

3.7.5 Existing Conditions Intersection Queuing Analysis

Synchro™ was used to calculate the 50th percentile queue lengths, and SimTraffic™ was used to calculate the 95th percentile queue lengths. The SimTraffic™ simulations have a statistical accuracy of plus or minus 4.3 percent error for the AM peak hour and 5.0 percent error for the PM peak hour simulations. Based on the Synchro™ and SimTraffic™ analysis, the following intersection approaches experience failing queue lengths in Synchro™ or SimTraffic™ (queue exceeds available lane storage). Eleven signalized intersections would experience queuing lengths that would exceed the available storage capacity. The remaining intersections in the study area would provide sufficient storage for the anticipated demand. The lane group within the approach that is operating under unacceptable conditions is noted in parentheses.

- Loisdale Road and Loisdale Court/Mall Access (Intersection #3)
  - Westbound Mall Access (right turns) during the AM peak hour
  - Eastbound Loisdale Court (left turns), westbound Mall Access (right turns) and northbound Loisdale Road (left turns) during the PM peak hour
- Loisdale Road and Hotel Entrance/Newington Road (Intersection #10)
  - Westbound Newington Road (all movements) during the PM peak hour
- Loisdale Road/I-95 (N) Ramp C and D and Fairfax County Parkway(Intersection #11)
  - Westbound Loisdale Road (left turns), northbound Fairfax County Parkway (combined through and right movements) and southbound Fairfax County Parkway (left and through movements) during the AM peak hour

    - Westbound Loisdale Road (left turns), northbound Fairfax County Parkway (all movements) and southbound Fairfax County Parkway (left turns) during the PM peak hour
- Frontier Drive and Best Buy/Springfield Mall Parking Lot Entrance (Intersection #14)
    - Eastbound Spring Mall Parking lot entrance (combined left, through and right movements) and northbound Frontier Drive (left turns) during the PM peak hour
- Frontier Drive and Spring Mall Drive (Intersection #16)
    - Northbound Frontier Drive (left turns) during the AM peak hour
    - Eastbound Spring Mall Drive (right turns), westbound Spring Mall Drive (combined left and through movements) and northbound Frontier Drive (left and through movements) during the PM peak hour
- Frontier Drive and Franconia-Springfield Parkway (Westbound) (Intersection #17)
    - Westbound F-S Parkway (westbound off ramp) (combined left and through movements, and right turns) and northbound Frontier Drive (through movements) during the PM peak hour
- Frontier Drive and Franconia-Springfield Parkway (Eastbound) (Intersection #18)
    - Eastbound F-S Parkway (eastbound off ramp) (right turns) during the AM peak hour
    - Northbound Frontier Drive (combined through and right movements) and southbound Frontier Drive (left turns) during the PM peak hour
- Franconia-Springfield Parkway and Spring Village Drive/Bonniemill Lane (Intersection #19)
    - Northbound Bonniemill Lane (right turns) during the AM peak hour
- Franconia-Springfield Parkway and I-95 HOT Lane Ramps (Intersection #20)
    - Eastbound F-S Parkway (through movements) during PM peak hour
- Franconia-Springfield Parkway/Manchester Boulevard and Beulah Street (Intersection #21)
    - Northbound Beulah Street (left turns and through movements) and southbound Beulah Street (through movements) both AM peak hour
    - Westbound Manchester Boulevard (left turns), northbound Beulah Street (left turns and through movements) and southbound Beulah Street (all movements) during the PM peak hour
- Franconia Road and Beulah Street (Intersection #22)
    - Westbound Franconia (left turns) during the AM and PM peak hour

None of the unsignalized intersection approaches in the study area would experience failing queue lengths for the 95th percentile. The remaining intersections in the study area have acceptable queue lengths. See table 3-25 for more details on the percentile values observed at each intersection. Note that the percentile values are expressed in feet, and an average car plus space between the next vehicle requires roughly 25 feet of space.

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
1	**Loisdale Road/Commerce Street & Franconia Road (Westbound) (Signalized)**						
	WB (Franconia Rd)	L	590	111	163	172	220
	WB (Franconia Rd)	T	1,107	293	310	312	292
	WB (Franconia Rd)	R	-	115	-	34	-
	NB (Commerce St)	L	75	0	18	15	41
	NB (Commerce St)	LT	75	26	33	15	42
	SB (Commerce St)	T	722	110	150	259	262
	SB (Commerce St)	R	400	0	177	72	254
2	**Loisdale Road/Commerce Street & Franconia Road (Eastbound) (Signalized)**						
	EB (Franconia Rd)	L	300	121	175	73	115
	EB (Franconia Rd)	T	463	205	245	260	272
	EB (Franconia Rd)	R	300	0	58	0	99
	NB (Loisdale Rd)	T	1,009	236	209	354	591
	NB (Loisdale Rd)	R	1,469	0	127	0	176
	SB (Loisdale Rd)	L	75	5	28	0	21
	SB (Loisdale Rd)	T	75	5	29	0	31
3	**Loisdale Road & Loisdale Court/Mall Access (Signalized)**						
	EB (Loisdale Court)	L	200	25	75	268	#254
	EB (Loisdale Court)	TR	850	2	46	35	378
	WB (Mall Access)	L	140	3	23	75	122
	WB (Mall Access)	T	140	4	32	21	96
	WB (Mall Access)	R	30	0	#63	0	#59
	NB (Loisdale Rd)	L	195	18	92	54	#220
	NB (Loisdale Rd)	T	740	127	170	281	372
	NB (Loisdale Rd)	R	150	0	24	0	134
	SB (Loisdale Rd)	L	1,469	14	73	171	446
	SB (Loisdale Rd)	T	1,469	84	120	467	844
	SB (Loisdale Rd)	R	140	0	41	7	140

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours (continued)

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
4	**Loisdale Road & Ramp from NB I-95/Spring Mall Drive (Signalized)**						
	EB (Ramp from NB I-95)	L	425	106	110	148	146
	EB (Ramp from NB I-95)	LT	414	111	174	151	189
	EB (Ramp from NB I-95)	R	325	0	50	0	21
	WB (Spring Mall Dr)	L	1,208	44	102	110	156
	WB (Spring Mall Dr)	R	2,417	3	98	52	109
	NB (Loisdale Rd)	TR	537	165	202	264	228
	NB (Loisdale Rd)	R	275	0	70	0	102
	SB (Loisdale Rd)	L	485	54	124	195	470
	SB (Loisdale Rd)	T	740	78	141	59	303
5	**Loisdale Road & Metropolitan Center Drive (TWSC)**						
	WB (Metropolitan Center Dr)	L	587	-	25	-	37
	WB (Metropolitan Center Dr)	R	587	-	45	-	41
	NB (Loisdale Rd)	T	601	-	-	-	0
	NB (Loisdale Rd)	R	170	-	2	-	3
	SB (Loisdale Rd)	L	270	-	51	-	74
6	**Loisdale Road & Northern Entrance Road to GSA Facility (Access to Building A, 66808 & 6610 Loisdale Road) (TWSC)**						
	WB (N Ent Rd to GSA)	L	592	-	5	-	14
	NB (Loisdale Rd)	TR	812	-	3	-	-
	SB (Loisdale Rd)	L	594	-	38	-	-
7	**Loisdale Road & Southern Entrance Road to GSA Facility (Access to Building B, 7000 Loisdale Road) (TWSC)**						
	WB (S Ent Rd to GSA)	L	619	-	28	-	41
	WB (S Ent Rd to GSA)	R	619	-	47	-	50
	NB (Loisdale Rd)	TR	567				
	SB (Loisdale Rd)	L	900	-	66	-	14
8	**Loisdale Road & Springfield Center Drive (TWSC)**						
	WB (Springfield Center Dr)	LR	546	-	39	-	78
	NB (Loisdale Rd)	TR	2,428	-	8	-	-
	SB (Loisdale Rd)	L	700	-	70	-	41
9	**Loisdale Road & Lois Drive (TWSC)**						
	WB (Lois Drive Dr)	LR	696	-	50	-	36
	NB (Loisdale Rd)	TR	1,618	-	-	-	0
	SB (Loisdale Rd)	L	1,000	-	19	-	23

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours (continued)

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
10	**Loisdale Road & Hotel Entrance/Newington Road (Signalized)**						
	EB (Hotel Entrance)	LTR	422	6	49	6	66
	WB (Newington Rd)	LT	667	119	219	235	#870
	WB (Newington Rd)	R	165	0	137	0	#245
	NB (Loisdale Rd)	L	300	4	14	42	70
	NB (Loisdale Rd)	T	578	171	117	78	77
	NB (Loisdale Rd)	R	365	151	97	64	58
	SB (Loisdale Rd)	L	500	32	89	114	217
	SB (Loisdale Rd)	T	566	19	49	163	304
	SB (Loisdale Rd)	R	450	0	0	0	23
11	**Loisdale Road/I-95 (N) Ramp C & D & Fairfax County Parkway (Signalized)**						
	EB (I-95 Northbound Off-Ramp)	T	312	150	255	44	73
	EB (I-95 Northbound Off-Ramp)	R	-	0	-	0	-
	WB (Loisdale Rd)	L	578	~183	324	~532	#713
	WB (Loisdale Rd)	R	471	120	165	327	381
	NB (Fairfax County Pkwy)	T	854	534	492	777	#750
	NB (Fairfax County Pkwy)	TR	300	534	#373	777	#415
	SB (Fairfax County Pkwy)	L	390	373	#479	~330	390
	SB (Fairfax County Pkwy)	T	636	1562	#717	357	325
	SB (Fairfax County Pkwy)	R	623	0	375	0	-
12	**Frontier Drive & Franconia Road (Westbound) (Signalized)**						
	WB (Franconia Rd)	L	450	95	130	126	159
	WB (Franconia Rd)	T	774	360	341	198	214
	WB (Franconia Rd)	TR	580	360	490	198	304
	NB (Frontier Dr)	L	74	79	48	43	40
	NB (Frontier Dr)	T	74	6	20	3	23
	SB (Frontier Dr)	T	441	74	104	58	89
	SB (Frontier Dr)	TR	240	74	105	58	116
13	**Frontier Drive & Franconia Road (Eastbound) (Signalized)**						
	EB (Franconia Rd)	L	475	28	56	82	119
	EB (Franconia Rd)	T	1,079	126	144	193	220
	EB (Franconia Rd)	R	-	43	-	3	-
	NB (Frontier Dr)	T	831	307	569	323	519
	NB (Frontier Dr)	R	480	0	152	66	200
	SB (Frontier Dr)	LT	74	4	28	5	25

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours (continued)

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
14	**Frontier Drive & Best Buy/Springfield Mall Lot Entrance (Signalized)**						
	EB (Springfield Mall Lot Ent)	L	199	13	27	143	117
	EB (Springfield Mall Lot Ent)	LTR	199	9	56	69	#239
	WB (Best Buy Ent)	L	207	56	100	106	149
	WB (Best Buy Ent)	TR	207	8	52	15	118
	NB (Frontier Dr)	L	190	50	92	163	#195
	NB (Frontier Dr)	T	562	56	159	67	177
	NB (Frontier Dr)	R	500	0	24	0	44
	SB (Frontier Dr)	L	240	50	110	122	178
	SB (Frontier Dr)	T	939	80	102	150	188
	SB (Frontier Dr)	R	300	0	30	54	58
15	**Frontier Drive & Home Depot/Springfield Mall Garage Entrance (Signalized)**						
	EB (Springfield Mall Garage Ent)	LT	166	2	13	22	56
	EB (Springfield Mall Garage Ent)	R	100	0	-	0	20
	WB (Home Depot Ent)	LTR	256	84	196	57	267
	NB (Frontier Dr)	L	190	8	26	21	48
	NB (Frontier Dr)	T	469	49	137	76	160
	NB (Frontier Dr)	R	300	0	30	1	38
	SB (Frontier Dr)	L	310	117	177	189	225
	SB (Frontier Dr)	T	562	28	59	67	79
	SB (Frontier Dr)	R	-	0	-	0	-
16	**Frontier Drive & Spring Mall Drive (Signalized)**						
	EB (Spring Mall Dr)	L	215	78	116	97	160
	EB (Spring Mall Dr)	LT	2,417	81	181	98	1453
	EB (Spring Mall Dr)	R	1,351	0	360	230	#1361
	WB (Spring Mall Dr)	LT	224	25	56	153	#267
	WB (Spring Mall Dr)	R	224	0	39	0	155
	NB (Frontier Dr)	L	480	386	#591	500	#665
	NB (Frontier Dr)	T	717	201	489	232	#1025
	NB (Frontier Dr)	R	275	0	35	21	39
	SB (Frontier Dr)	L	200	24	75	33	122
	SB (Frontier Dr)	T	469	102	178	222	276
	SB (Frontier Dr)	R	225	0	69	26	196

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours (continued)

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
17	**Frontier Drive & Franconia-Springfield Parkway (Westbound) (Signalized)**						
	WB (F-S Pkwy WB Off-ramp)	L	460	15	40	11	53
	WB (F-S Pkwy WB Off-ramp)	LT	792	14	62	11	#996
	WB (F-S Pkwy WB Off-ramp)	R	450	0	97	0	#624
	NB (Frontier Dr)	L	262	6	10	10	114
	NB (Frontier Dr)	T	262	12	66	12	#313
	SB (Frontier Dr)	T	623	219	266	169	485
	SB (Frontier Dr)	R	220	20	113	119	143
18	**Frontier Drive & Franconia-Springfield Parkway (Eastbound) (Signalized)**						
	EB (F-S Pkwy EB Off-ramp)	L	950	205	418	172	663
	EB (F-S Pkwy EB Off-ramp)	LT	950	205	686	176	583
	EB (F-S Pkwy EB Off-ramp)	R	430	349	#510	0	176
	NB (Frontier Dr)	TR	157	103	136	277	#208
	SB (Frontier Dr)	L	262	8	108	65	#313
	SB (Frontier Dr)	T	197	11	15	0	14
19	**Franconia-Springfield Parkway & Spring Village Drive/Bonniemill Lane (Signalized)**						
	EB (Franconia-Springfield Pkwy)	L	520	76	280	39	68
	EB (Franconia-Springfield Pkwy)	T	1,063	2288	811	295	251
	EB (Franconia-Springfield Pkwy)	R	395	0	75	0	11
	WB (Franconia-Springfield Pkwy)	L	415	108	126	207	249
	WB (Franconia-Springfield Pkwy)	T	2,515	154	147	927	408
	WB (Franconia-Springfield Pkwy)	R	410	0	30	0	134
	NB (Bonniemill Ln)	L	160	39	51	15	34
	NB (Bonniemill Ln)	T	160	7	13	3	12
	NB (Bonniemill Ln)	R	160	249	#182	0	51
	SB (Spring Village Dr)	L	250	227	239	197	229
	SB (Spring Village Dr)	T	830	7	84	9	103
	SB (Spring Village Dr)	R	250	0	41	0	110
20	**Franconia-Springfield Parkway & I-95 HOT Lane Ramps (Signalized)**						
	EB (Franconia-Springfield Pkwy)	L (AM)	640	219	383	-	-
	EB (Franconia-Springfield Pkwy)	T	876	282	222	558	#488
	EB (Franconia-Springfield Pkwy)	(PM)	-	-	-	0	-
	WB (Franconia-Springfield Pkwy)	L (PM)	425	-	-	148	296
	WB (Franconia-Springfield Pkwy)	T	1,050	210	247	1189	596
	WB (Franconia-Springfield Pkwy)	(AM)	600	0	59	-	-
	NB (I-95 HOT Lane Off-ramp)	(AM)	962	69	202	-	-
	SB (I-95 HOT Lane Off-ramp)	(PM)	1,071	-	-	325	520

Table 3-25: Existing Conditions Queuing Analysis for AM and PM Peak Hours (continued)

#	Intersection	Lane Group	Turning Bay/Link Length (feet)	AM Peak Hour		PM Peak Hour	
				50th Percentile (feet)	95th Percentile (feet)	50th Percentile (feet)	95th Percentile (feet)
21	**Franconia-Springfield Parkway/Manchester Boulevard & Beulah Street (Signalized)**						
	EB (Franconia-Springfield Pkwy)	L	610	324	352	227	279
	EB (Franconia-Springfield Pkwy)	T	4,336	365	317	815	580
	EB (Franconia-Springfield Pkwy)	R	4,336	36	161	626	494
	WB (Manchester Blvd)	L	375	95	284	180	#458
	WB (Manchester Blvd)	T	813	524	483	754	673
	WB (Manchester Blvd)	R	575	0	85	0	238
	NB (Beulah St)	L	500	~541	#547	~493	#564
	NB (Beulah St)	T	1,016	348	#1249	294	#1326
	NB (Beulah St)	R	315	0	163	0	126
	SB (Beulah St)	L	380	68	140	220	#384
	SB (Beulah St)	T	942	~233	388	~406	#792
	SB (Beulah St)	R	235	49	200	111	#374
22	**Franconia Road & Beulah Street (Signalized)**						
	EB (Franconia Rd)	L	190	1	15	4	69
	EB (Franconia Rd)	TR	6,354	219	198	455	417
	WB (Franconia Rd)	L	350	453	#410	614	#443
	WB (Franconia Rd)	TR	965	90	277	162	646
	NB (Beulah St)	LT	659	127	163	233	442
	NB (Beulah St)	R	659	569	387	196	267
	SB (Driveway)	LTR	249	7	25	43	93
23	**I-95 NB On-ramp & Commerce Street (Signalized)** [a]						
	EB (Commerce St)	L	63	-	-	1	63
	EB (Commerce St)	T	-	-	-	0	-
	WB (Commerce St)	T	92	-	-	43	92
	WB (Commerce St)	R	80	-	-	0	80

Notes:

~ 50th percentile volume exceeds capacity, queue is theoretically infinite.

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

m Volume for 95th percentile queue is metered by upstream signal. Due to upstream metering, the 95th percentile queue may be less than the 50th percentile queue.

EB = Eastbound, WB = Westbound, NB= Northbound, SB = Southbound

LTR = left / through / right lanes

TWSC = Two-way STOP-Controlled unsignalized intersection

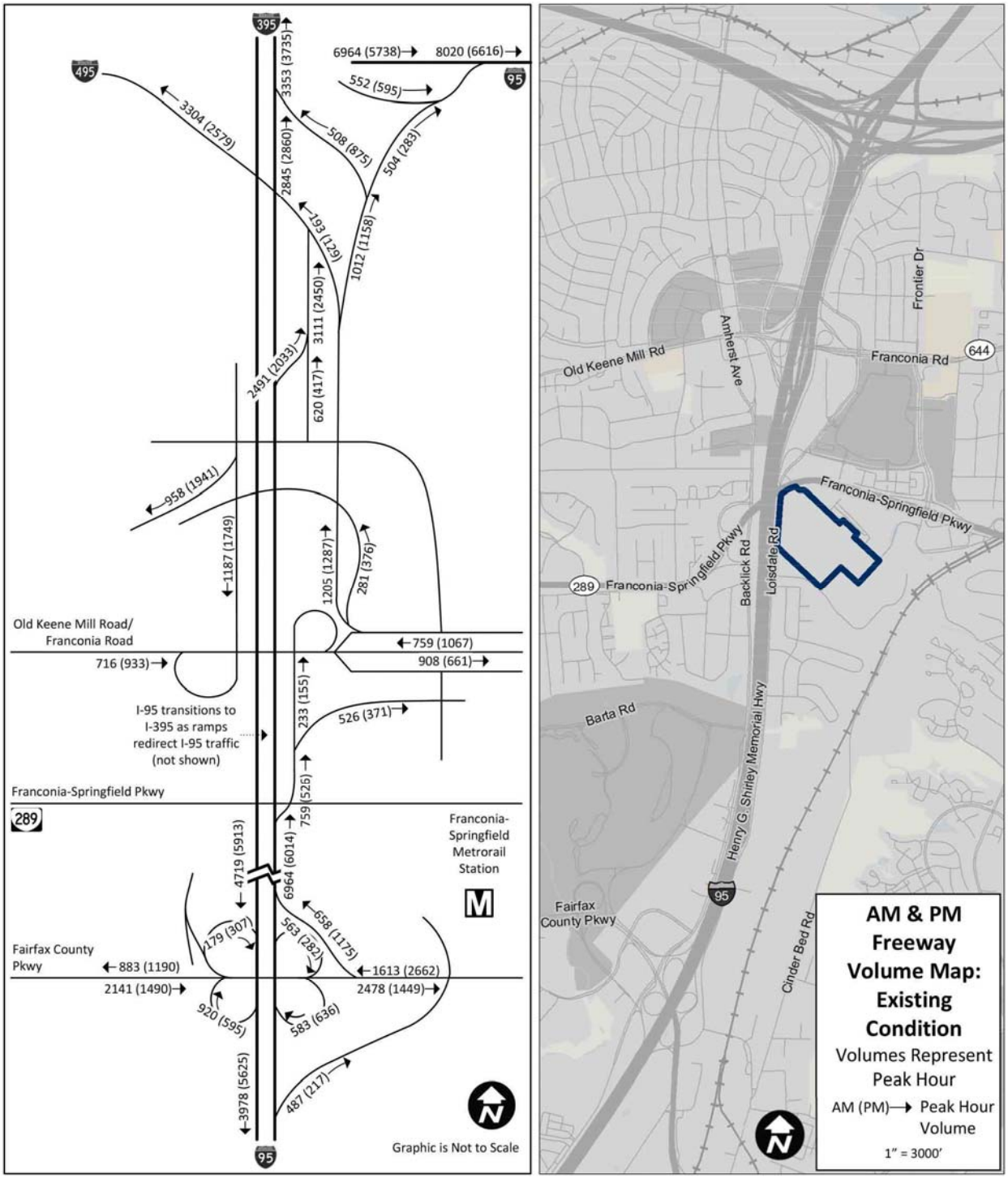
Red cells denote approaches and lane groups whose queuing length exceeds capacity.

[a] Intersection not analyzed during the AM peak hour.

3.7.6 Freeway Analysis

Following the Springfield Transportation Agreement, freeway analysis was not performed for the Existing Condition, freeway ramp volumes are included in figure 3-20 to allow a comparison to the No-build, Build, and Build with Mitigation Condition freeway ramp volumes presented in Sections 4.7, 5.8, and 6.6, respectively. Full analysis of the freeway volumes is included in the Build with Mitigation Condition in Section 6.6.

Figure 3-20: Existing Condition Freeway Volumes



3.8 Crash Analysis

Crash ratings are used in transportation analyses to help determine where additional attention or examination of safety should be undertaken. Crash ratings are evaluated based on recorded crash information collected by a jurisdiction, in this case, 3 years of data from VDOT (2011–2013), and calculated using the accident information and the daily volume of vehicles that travel through the intersection (VDOT 2015c). Crash ratings are calculated based on the number of crashes that would occur per million entering vehicles (MEV) using the following formula:

$$\text{Rate} = \frac{C * 1{,}000{,}000}{n * 365 * V}$$

In this formula, C is the total number of intersection-related crashes in the study period, *n* is the number of years of data (i.e., study period), and *V* is the traffic volumes entering the intersection daily. Crash and injury ratings were calculated and provided by VDOT using the above formula.

Crash ratings for the intersections in the study area are presented in table 3-26. According to the Institute for Transportation Engineer's (ITE's) *Transportation Impact Analyses for Site Development* (ITE 2010), an accident rate of 1.0 or higher is an indication that further study is needed. While several Springfield study area intersections have a crash or injury rating over 1.0 crashes per MEV, including intersections #1 and #2 and intersections #12 and #13, all of these intersections were combined with another intersection to create the higher combined intersection crash/injury rating meaning the independent intersections themselves do not have a crash rating over 1.0 and do not warrant further analysis. Besides the combined intersections, the intersection with the next highest crash rating was Loisdale Road and Loisdale Court, near the Springfield Mall, with a crash rating of 0.92 crashes per MEV. It should also be noted that two deaths were reported at intersections #1 and #2 between 2011 and 2013, one person in a vehicle and one pedestrian.

Table 3-26: Intersection Crash Summary

Intersection Number	Intersection Name (Cross Streets)	Crash Rate (crashes/MEV*)	Injury Rate (crashes/MEV*)
1 & 2**	Loisdale Road/Commerce Street & Franconia Road (WB) and Loisdale Road/Commerce Street & Franconia Road (EB)	1.83	1.49
3	Loisdale Road & Loisdale Court	0.92	0.62
4	Loisdale Road & Spring Mall Drive	0.22	0.09
5	Loisdale Road & Metropolitan Center Drive	0.38	0.10
6	Loisdale Road & Northern entrance road to GSA facility	NA	NA
7	Loisdale Road & Southern entrance road to GSA facility	NA	NA
8	Loisdale Road & Springfield Center Drive	0.10	0.00
9	Loisdale Road & Lois Drive	0.09	0.09
10	Loisdale Road & Newington Road	0.37	0.21
11	Loisdale Road & Fairfax County Parkway	0.50	0.17
12 & 13**	Frontier Drive & Franconia Road (WB) and Frontier Drive & Franconia Road (EB)	1.30	0.93
14	Frontier Drive & Best Buy/Springfield Mall parking lot	0.14	0.07
15	Frontier Drive & Home Depot/Springfield Mall garage	0.07	0.00
16	Frontier Drive & Spring Mall Road	0.63	0.28
17	Frontier Drive & Franconia-Springfield Parkway (WB)	0.32	0.21
18	Frontier Drive & Franconia-Springfield Parkway (EB)	0.08	0.00
19	Franconia-Springfield Parkway & Spring Valley Drive	0.30	0.30
20	I-95 HOT Lanes on/off-ramps & Franconia-Springfield Parkway	NA	NA
21	Franconia-Springfield Parkway & Beulah Street	0.43	0.27
22	Franconia Road & Beulah Street	0.78	0.63
23	Commerce Street & I-95 on-ramp	NA	NA

Source: VDOT crash and injury ratings from crash data from 2011-2013, received February 2015.

Notes:

*MEV = million entering vehicles

**Due to the proximity between locations, Intersections #1 & #2 and #12 & #13 were analyzed together

EB = Eastbound, WB = Westbound, NA = Crash data not available

Intersections depicted in light blue have a crash rating over 1.0 and may warrant further analysis.

4.0 Analysis of No-build Condition

This chapter introduces the No-build Condition for the Springfield site and summarizes the potential impacts on the pedestrian network, bicycle network, public transit system, parking conditions, truck access, and traffic operations caused if the consolidation of FBI HQ at the Springfield site does not occur.

The Springfield No-build Condition is unique from the No-action Condition described in the FBI HQ Consolidation DEIS because it only analyzes the conditions at the Springfield site and does not factor in the impacts from the exchange of the JEH parcel in Washington, DC. Under the No-build Condition, GSA would continue to maintain the FBI HQ building in Washington, D.C., or one of the other two site alternatives would be selected. The Springfield site would not be redeveloped as a new consolidated FBI HQ and instead would continue in its current use as a GSA-owned property.

4.1 No-build Condition Improvements

4.1.1 Planned Developments

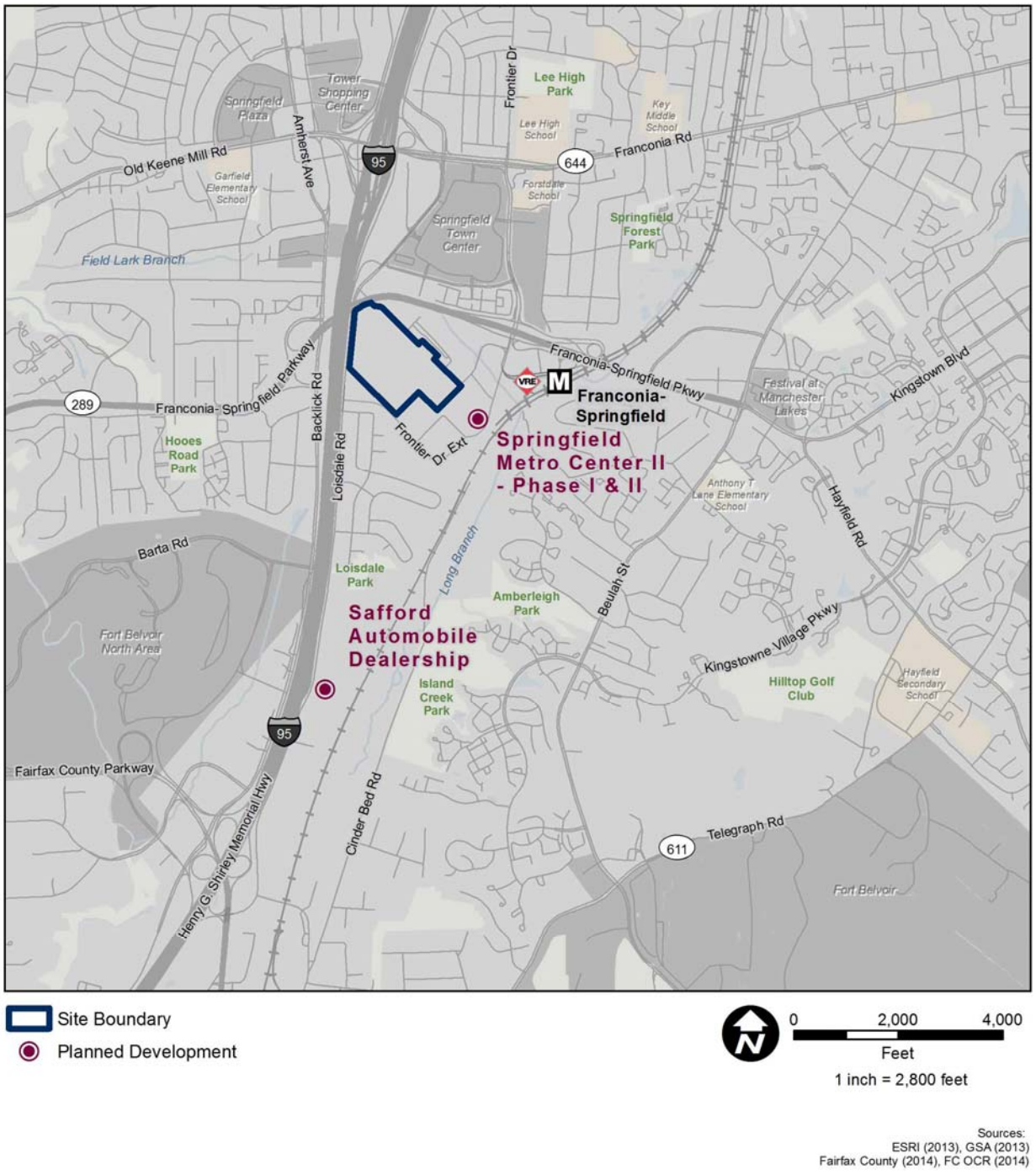
According to the Springfield Site Transportation Agreement (Appendix E1), three planned developments were included as part of the No-build Condition. These developments ranged from a small 80,000 SF automobile dealership to up to two approximately 500,000 SF office buildings with associated parking. The developments would be located south of Franconia-Springfield Parkway along Loisdale Road or along a planned southern extension of Frontier Drive. The planned developments include the projects as shown in figure 4-1:

Safford Automobile Dealership (GS 2013) composed of 80,000 SF of retail space located along Loisdale Road approximately 1 mile north of Fairfax County Parkway and 0.5 mile south of Lois Drive. The primary access would be from Loisdale Road.

Springfield Metro Center II Phase I (Wells & Associates Inc. 2008; 2014) composed of 544,120 SF of office located along the proposed extension of Frontier Drive, 0.3 mile south of Franconia Springfield Parkway and north of Northern Virginia Community College (NVCC). According to the site plan, there would be four access points to the development from the Frontier Drive extension and the development would also include one large shared parking garage. After Phase I of this project, which is anticipated to be built prior to 2022, a second phase of office development with two additional buildings is planned for a total development of nearly 1,000,000 SF of office development by full build-out.

Figure 4-1 shows the planned development project locations.

Figure 4-1: Planned Development Projects



4.1.2 Planned Roadway Improvements

There are a number of planned roadway improvements scheduled to be constructed by the project horizon year (2022) including a new roadway, redesign of the roadways serving the Franconia-Springfield Metro Station, widening of several road segments, and substantial upgrades to existing intersection geometry. Many of these improvements are part of the Springfield Town Center Proffers (FCDOT 2015a). FCDOT selected the specific

proffers to include in this study through the Springfield Site Transportation Agreement. The planned improvements are as follows:

A. The Frontier Drive Extension would consist of a four-lane roadway with a parkway through the median and would directly connect Loisdale Road to the Franconia-Springfield Metro station and Franconia-Springfield Parkway. This new connection is planned in conjunction with the redesign of the Metrorail station access roadways and would change the station's access points and circulation pattern. The planned Frontier Drive Extension would improve access to several points including the Metrorail station, the proposed developments along the planned extension, the existing NVCC campus, and other available parcels.

B. The Franconia-Springfield Metro Station redesign would alter the access to and from the station by changing the circulation from a one-direction looping network of roadways (similar to an airport design) to two sets of access roadways. One set would serve the Kiss & Ride, bus bays, and south/west garage access points. The other set would serve the north/east garage access points. Both sets would join at a proposed roundabout in the station's southwest corner. The new design would continue to provide access from Frontier Drive and Franconia-Springfield Parkway to the station garage, but would require specific garage exits to access these roadways. All Kiss & Ride and bus bay access would only be accessible from Frontier Drive and would only exit to Franconia Springfield Parkway or a set of new ramps connecting back to Frontier Drive at the Franconia-Springfield Parkway westbound on/off-ramps intersection. A new intersection would be added to the Frontier Drive Extension and Metrorail station that would include constructing three southbound left-turn lanes from the Frontier Drive Extension to the Metrorail station, one right-turn lane from the Frontier Drive Extension to the Metrorail station, and one combined right- and left-turn lane from the Metrorail station to the Frontier Drive Extension.

C. Loisdale Road and VA286 (Fairfax County Parkway) would include a second southbound left-turn lane from VA 286 southbound to Loisdale Road, a second westbound left from Loisdale Road to VA 286 southbound, and an exclusive northbound right-turn lane from VA 286 to Loisdale Road.

D. Loisdale Road and Frontier Drive Extension would include the installation of a new traffic signal, a southbound left-turn lane from Loisdale Road to Frontier Drive Extension, a northbound right-turn lane from Loisdale Road to Frontier Driver Extension, and the westbound approach would include one left-turn-lane and one right-turn lane.

E. Loisdale Road and Metropolitan Center Drive would include the installation of a new traffic signal.

F. Loisdale Road and Spring Mall Drive would include widening southbound Loisdale Road between South Street and Spring Mall Drive to two through lanes, one full-length left-turn lane and one left-turn bay onto eastbound Spring Mall Drive. It would also include constructing a new right-turn bay from the eastbound I-95 off-ramp to southbound Loisdale Road and modifying the remaining approach lanes to accommodate two through lanes onto Spring Mall Drive and two dedicated left-turn lanes onto northbound Loisdale Road, in addition to the right-turn bay.

G. Loisdale Road and Lois Lane/South Street would include widening northbound Loisdale Road to accommodate a third through lane from Spring Mall Drive to Lois Lane, widening southbound Loisdale Road between Franconia Road and South Street to three through lanes, and constructing a second left-turn bay onto eastbound South Street.

H. Loisdale Road and Franconia Road Eastbound would include widening Franconia Road to accommodate a third eastbound through lane from approximately 750 feet west of Loisdale Road, or the maximum extent possible as determined by FCDOT, to Village Drive, widening northbound Loisdale Road to accommodate a second northbound through lane from Lois Lane through the intersection with Franconia Road. The

northbound approach would include three left-turn lanes, two through lanes, and one right-turn lane. The three left-turn lanes and two through lanes would continue through the next intersection (Franconia Road Westbound).

I. Frontier Drive and Spring Mall Drive would include constructing an additional left-turn lane from northbound Frontier Drive onto westbound Spring Mall Drive, including an at-least 4-feet-wide pedestrian refuge in the Frontier Drive median.

J. Frontier Drive and Franconia-Springfield Parkway Westbound on/off ramps would include removing the island channelizing the southbound right-turn movement from Frontier Drive onto westbound Franconia-Springfield Parkway, to create dual right-turn lanes.

K. Frontier Drive and Franconia-Springfield Parkway Eastbound on/off ramps would include adding a northbound right-turn movement from Frontier Drive onto eastbound Franconia-Springfield Parkway.

L. Frontier Drive Extension and Metropolitan Center Drive Extension would include a new unsignalized intersection with the Metropolitan Center Drive Extension eastbound approach STOP-sign controlled.

M. Franconia-Springfield Parkway and I-95 HOT Lanes would include adding a second left-turn lane from Franconia-Springfield Parkway to I-95 HOT Lanes northbound.

Figure 4-2 shows the No-build Condition planned roadway improvement locations. Figure 4-3 shows the No-build Condition planned roadway improvements lane geometry.

Figure 4-2: Springfield No-build Condition Planned Roadway Improvement Locations

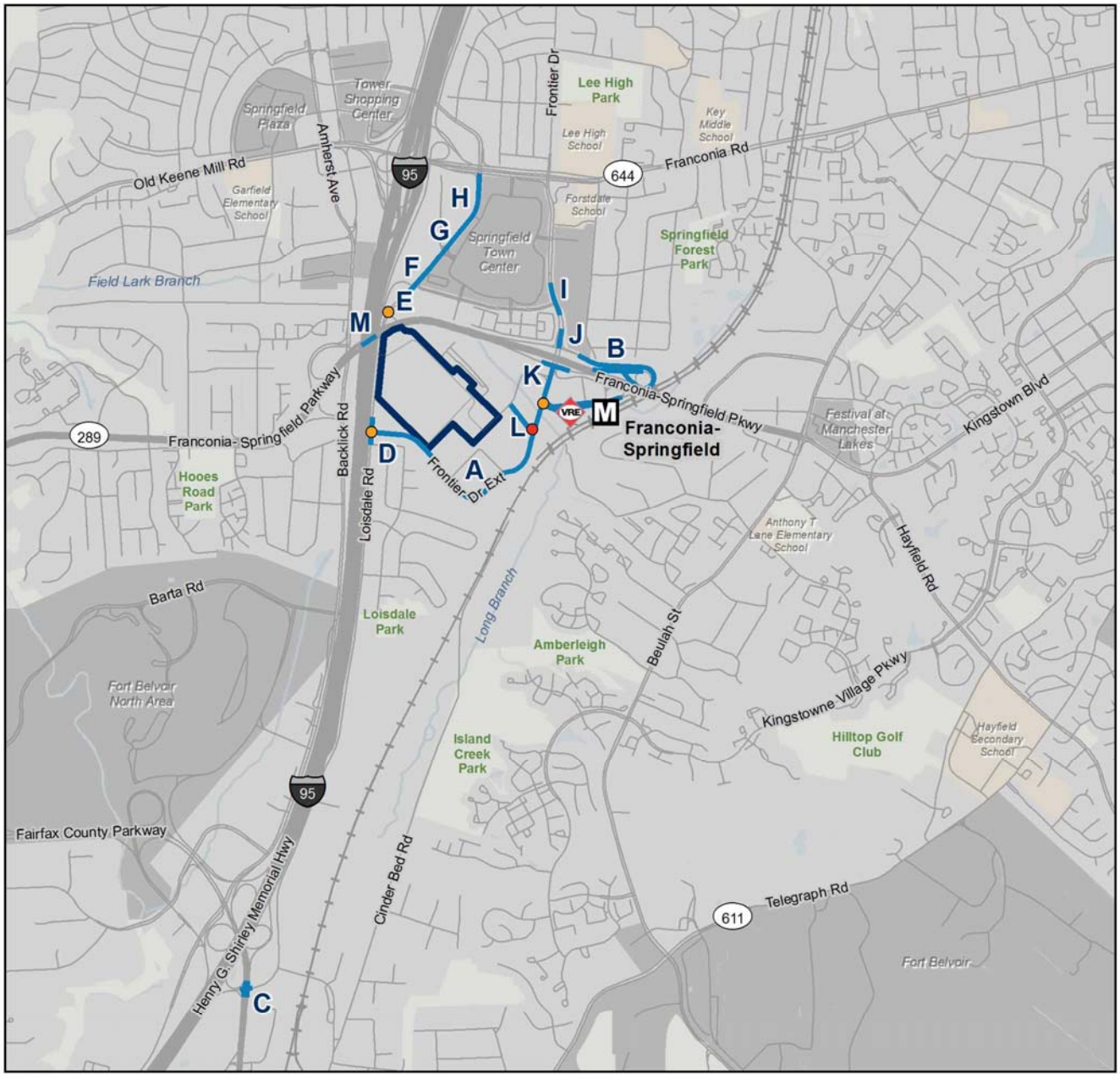


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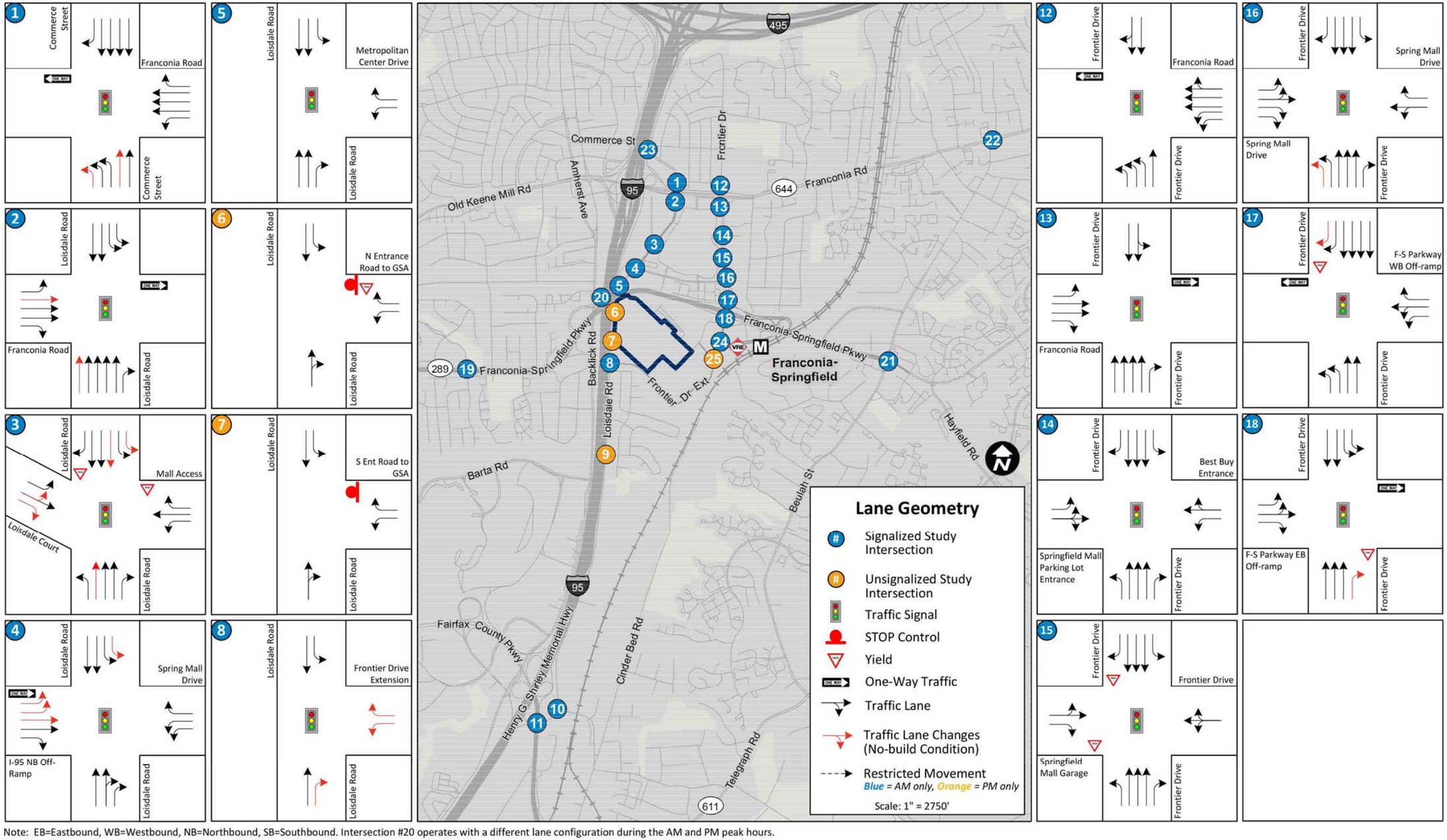
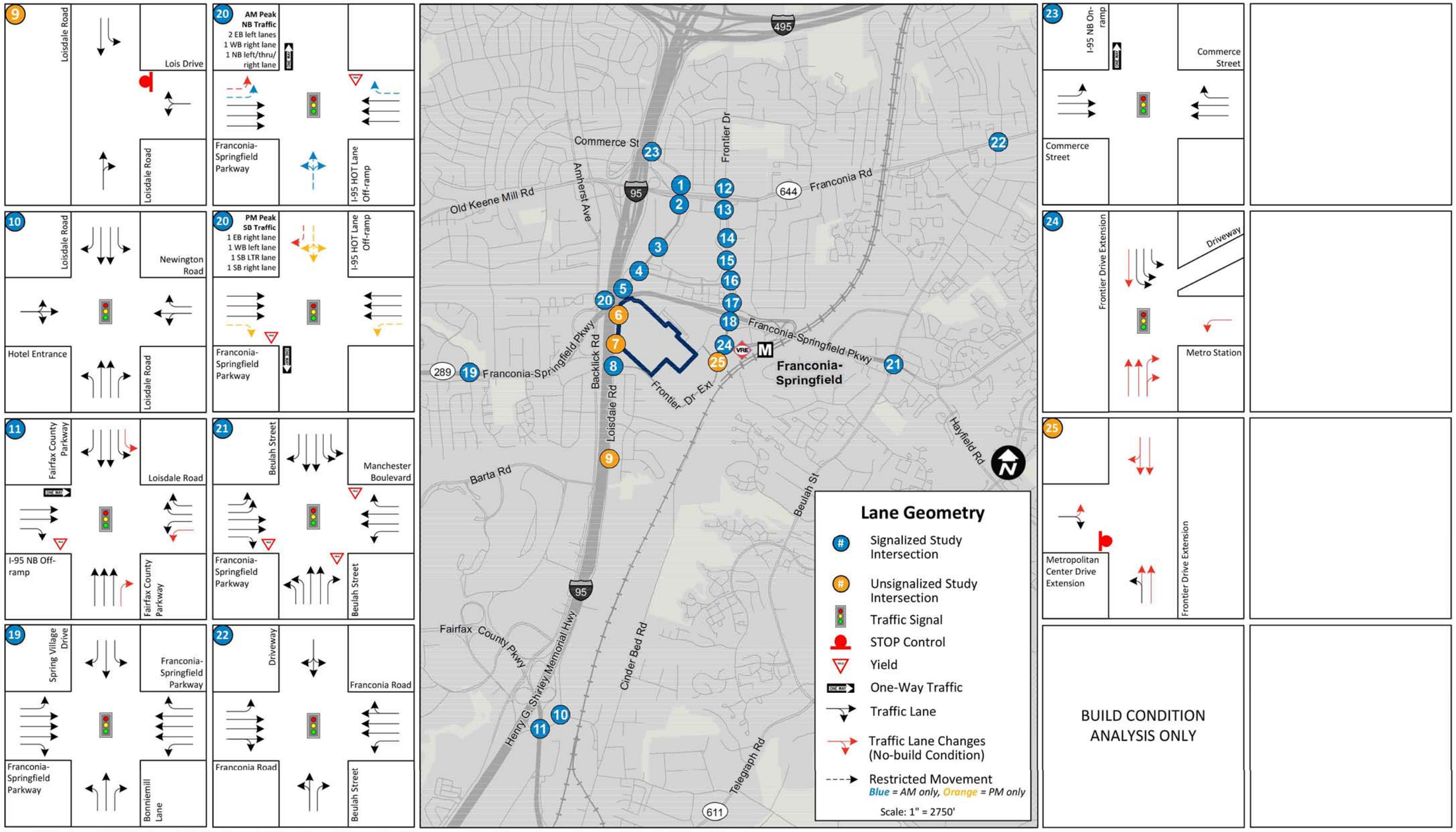
Figure 4-3: Springfield No-build Condition Lane Geometry Map



Note: EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound. Intersection #20 operates with a different lane configuration during the AM and PM peak hours.

Figure 4-3: Springfield No-build Condition Lane Geometry Map (continued)



Note: EB=Eastbound, WB=Westbound, NB=Northbound, SB=Southbound. Intersection #20 operates with a different lane configuration during the AM and PM peak hours.

4.2 Pedestrian Network

Although there were no clear pedestrian funding categories in the Northern Virginia Transportation Improvement Plan (TIP) for FY 2015-2020, the Greater Springfield Chamber of Commerce and county staff have been working to direct attention and funds to the Franconia-Springfield District for pedestrian and bicycle improvements (Fairfax County Office of Community Revitalization (FC OCR) (2014a). The Fairfax County FY 2015 – FY 2019 Adopted Capital Improvement Program (CIP) does include a fund for Springfield Streetscape Revitalization, but detailed improvement plans were not released (Fairfax County 2014d).

With implementation of the Frontier Drive Extension to intersect with Loisdale Road via Springfield Center Drive, upgrades to sidewalks along the extension are expected to adhere to the new Franconia-Springfield District's streetscape guidelines that were adopted by the county's Comprehensive Plan. These improvements would improve the pedestrian access within the study area by providing additional connectivity. The Springfield Metro Center II Phase I project would also provide additional pedestrian sidewalks and amenities in the study area, improving the pedestrian environment near the Springfield site. The additional traffic from the Frontier Drive Extension and the Springfield Metro Center II project would create the opportunity for more conflicts between pedestrians and vehicles, but these should be mitigated with pedestrian crosswalks, traffic calming, and if needed, traffic controls designed with the project.

Therefore, under the No-build Condition, impacts on pedestrians would overall be direct, long-term, and beneficial because pedestrians would have crossings at the intersections or protected crossing locations, and the increased connections would improve their access to the surrounding street network and nearby land uses.

4.3 Bicycle Network

The Fairfax County Bicycle Master Plan recommends new bicycle lanes on several roadways within the study area, including Backlick Road, Loisdale Road, the planned Frontier Drive Extension (currently Springfield Center Drive adjacent to the Springfield site), Spring Mall Drive, and Frontier Drive (Fairfax County 2014a). FC OCR also notes that a safety improvement is currently in design for bicycle access improvements on Metropolitan Center Drive at the entrance to the Franconia-Springfield Parkway trail just north of the Springfield site (FC OCR 2014b). It is believed this improvement on Metropolitan Center Drive will provide the missing bicycle link between the end of the Franconia-Springfield Parkway trail on the eastern side of I-95 and the sidewalks on Loisdale Road that link to the pedestrian bridge over I-95, and subsequently to the western portion of the Franconia-Springfield Parkway trail. These recommended bicycle facilities are illustrated in table 4-1 and figure 4-4, along with the existing bicycle facilities in the study area. Currently, there is no date for implementation of these recommendations, with the exception of the Frontier Drive Extension bicycle lane facilities which VDOT plans to construct by 2022 (Springfield Site Transportation Agreement 2015; FCDOT 2014). In table 4-1 and figure 4-4, those bicycle facilities that are planned with no implementation date are shown as proposed, and the Frontier Drive Extension with a completion date of 2022 is shown as part of the No-build Condition.

In addition to the planned bicycle improvements noted above, the Fairfax County Board of Supervisors has committed funds in FY2015-2020 for installing covered bicycle parking to accommodate at least 30 bicycles at the Franconia-Springfield Metro Station and VRE Station (FCDOT 2014). With this project, access driveway pavement, lighting, and security improvements may also be provided. The Board of Supervisors has also committed funds to enhance both bicycle and pedestrian access from the NVCC Medical Education Campus, adjacent to the Springfield site, to the Franconia-Springfield Metro Station and nearby activity centers. These improvements would undoubtedly also benefit future FBI pedestrians and bicyclists.

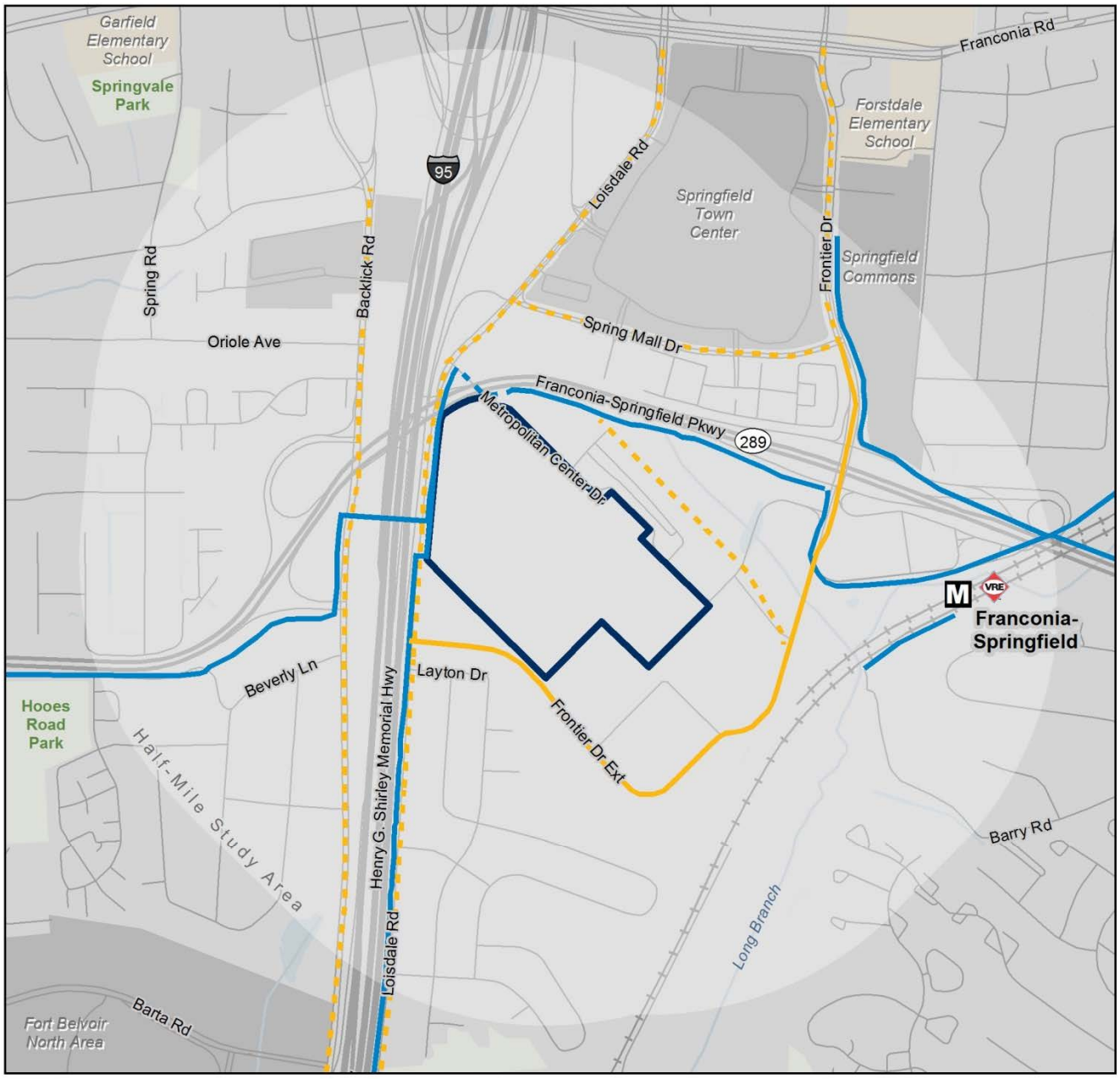
Table 4-1: Recommended Bicycle Facilities in the Springfield Study Area

Roadway	From/To	Type	Future Status	Notes
Backlick Road	Amherst Ave to Fairfax County Parkway	Bicycle Lane	Proposed	-
Loisdale Road	Franconia Road to Fairfax County Parkway	Bicycle Lane	Proposed	Includes climbing lane from Springfield Center Drive to Barta Road
Frontier Drive Extension (Springfield Center Drive)	Loisdale Road to Franconia-Springfield Parkway	Bicycle Lane	No-build Condition	Adjacent to Springfield site; this improvement is planned with the Frontier Drive Extension project
Spring Mall Drive	Loisdale Road to Frontier Drive	Bicycle Lane	Proposed	-
Frontier Drive	Franconia-Springfield Parkway to Franconia Road	Bicycle Lane	Proposed	Portions of this bicycle lane were built in 2015
Franconia-Springfield Parkway trail	On Metropolitan Center Drive at the entrance to the Franconia-Springfield Parkway trail	Trail Access Improvements	Proposed	Project will improve safety

Source: Fairfax County (2014a); FC OCR (2014b); FCDOT (2014); Site Visit (May 8, 2015).

As noted earlier, the Frontier Drive Extension project does include bicycle lanes in the planned project. Because this improvement is included in the No-build Condition roadway improvements, it is assumed the project with associated bicycle improvements would be complete by 2022, as well as the local area bicycle improvements funded by the Fairfax County Board of Supervisors for FY2015-2020 (FCDOT 2014). Therefore, there would be direct, long-term, beneficial impacts on bicycle conditions in the study area for the No-build Condition, with additional beneficial impacts if other planned improvements are implemented.

Figure 4-4: Proposed Springfield Area Bicycle Facilities



Sources:
ESRI (2013), GSA (2013), Fairfax County (2014)
Google Maps (2015), Louis Berger (2014)

4.4 Public Transit

The following sections describe the No-build Condition for the bus and Metrorail modes within the Springfield study area. Commuter rail, commuter bus, carsharing, slugging, and shuttles are not evaluated for the No-build Condition because future ridership information and planning documents were not available.

4.4.1 Projected Transit Growth

Growth in the transit mode was calculated for the year 2022 using regional transit growth rates and projected ridership associated with large planned projects in proximity to the site.

Growth in the transit mode was calculated for the year 2022 using regional transit growth rates. Regional transit growth rates were obtained using the Metropolitan Washington Council of Governments (MWCOG) Version 2.3.57 Regional Travel Demand Model, which projects an annual growth rate of 2.1 percent between 2008 and 2025 on the Metrorail system and 1.9 percent on the region's bus network (including Metrobus) (MWCOG 2015). The Metrorail growth rate was applied to ridership at the Franconia-Springfield Metro Station. The bus growth rate was applied to ridership on routes serving the Springfield study area.

There is one planned project, Springfield Metro Center, in proximity to the site. Fairfax County determined that 43 percent of the trips associated with this development were already accounted for in the MWCOG model background growth rate, so only 57 percent of the development's trips needed to be added following the Springfield Site Transportation Agreement (Appendix E1). Trips associated with this project were calculated based on ITE trip generation rates and the non-single occupancy vehicle (non-SOV) mode split determined in the traffic analysis section of this document (Section 4.7 *Traffic Analysis*) and the Springfield Site Transportation Agreement (Appendix E1). Fairfax County typically assigns 40 percent of trips to non-SOV modes for development projects located between 0.25-mile and 0.5-mile from a Metrorail station (Burke 2015). The non-SOV mode trips were further disaggregated (separated) into Metrorail trips and bus trips using bus and subway proportions from the 2009-2013 *American Community Survey* means of transportation data for the census tract containing the study area (U.S. Census Bureau 2009-2013). The *American Community Survey* is an on-going annual sampling of demographic data (including mode of travel) across the United States conducted by the U.S. Census Bureau. Metrorail trips associated with the Springfield Metro Center project were added to projected growth at Franconia-Springfield Metro Station, and bus trips associated with the project were added to projected growth in bus ridership within the study area.

4.4.2 Metrorail Analysis

The Metrorail analysis was conducted using projected ridership growth in the system at the Franconia-Springfield Metro Station and ridership projected for planned development projects in the study area.

4.4.2.1 Ridership Growth from Planned Projects

As previously mentioned, additional transit trips associated with the Springfield Metro Center development were added to future projected ridership at the Franconia-Springfield Metro Station. As noted in Section 4.4.1, 57 percent of the peak hour non-SOV project trips were used as the starting point to determine Metrorail trips associated with the Springfield Metro Center project. These trips associated with the development were disaggregated into peak hour Metrorail trips using subway proportions from the 2009-2013 *American Community Survey* (U.S. Census Bureau 2009-2013) means of transportation data for the census tract containing the development. The peak hour Metrorail passenger trips were then disaggregated into peak AM and PM 15-minute totals using the current AM and PM peak hour factors (PHF) at the station (WMATA 2014b). A PHF is the proportion of peak hour ridership that occurs during the peak 15-minute period in that hour. The additional Metrorail trips associated with the Springfield Metro Center project are summarized in table 4-2. AM peak 15-

minute ridership is used in the station platform and fare vending capacity analysis. PM peak 15-minute ridership is used in the station vertical and faregate aisle capacity analysis, the passenger load analysis, and the emergency evacuation (NFPA 130) analysis. Each represents the peak use, as described below.

Table 4-2: Projected Trips Associated with the Springfield Metro Center Project

Period	Springfield Metro Center Total Non-SOV Trips Per Hour			Metrorail Proportion of Non-SOV	Metrorail Passenger Trips Per Hour			Peak Hour Factor	Metrorail Passenger Trips Per 15-Minutes		
	IN	OUT	TOTAL		Exits	Entries	Total		Exits	Entries	Total
AM Peak	292	40	332	55.5%	162	22	184	25.3%	41	6	47
PM Peak	52	254	307	55.5%	29	141	170	29.1%	8	41	49

Source: WMATA (2014b); Springfield Site Transportation Agreement (Appendix E1); U.S. Census Bureau (2009-2013)

4.4.2.2 Regional Transit Growth Rate

Background ridership growth at the Franconia-Springfield Metro Station in the study area for 2022 was calculated based on the 2.1 percent Metrorail growth rate from the MWCOG travel demand model (MWCOG 2015). Table 4-3 summarizes projected 2022 weekday entries at Franconia-Springfield Metro Station, including background growth and growth from planned projects. Average weekday exits are assumed to be the same or very similar to average weekday entries.

Table 4-3: Weekday 2022 Projected Metrorail Ridership at Franconia-Springfield Metro Station

Metro Station	Average Weekday Entries			
	2014	2022 with Background Growth	2022 Planned Development Projects	2022 Total No-build
Franconia-Springfield	7,566	8,915	163	9,078

Source: WMATA (2014b); MWCOG (2015); Springfield Site Transportation Agreement (Appendix E1)

4.4.2.3 Metrorail Passenger Loads

Metrorail passenger loads at the Franconia-Springfield Metro Station were calculated based on projected 2022 ridership. Because it is a terminal station, passenger loads are equal to the total number of exiting passengers per train in the outbound direction (trains ending at the station) or the total number of entering passengers per train in the inbound direction (trains beginning at the station). Outbound exiting passengers during the PM peak period were higher than inbound entering passengers during the AM peak period at the station, and therefore, PM peak 15-minute exits were used for this analysis. Projected ridership was calculated using the regional Metrorail growth rate plus the additional trips associated with the planned developments.

No expansion of WMATA's current Metrorail fleet was assumed for this analysis to provide the most conservative estimate of potential capacity issues. WMATA's Momentum Plan, the agency's vision for the future including near-term goals for 2025, does call for all eight-car trains on all lines during peak periods by the year 2020; however, this would require significant upgrades to electrical systems and a significant expansion of WMATA's current fleet of railcars (WMATA 2014e).

All trains were assumed to have six cars with the exception of Blue line trains, which typically have eight cars during peak periods (WMATA 2014f). WMATA has three thresholds for railcar occupancy: less than 100

passengers per car (acceptable), between 100 and 120 passengers per car (crowded), and greater than 120 passengers per car (extremely crowded). Capacity is generally considered to be 120 passengers per car. Projected passenger loads by 2022 are below 100 passengers per car and therefore would be considered acceptable. Table 4-4 summarizes passenger loads per car in 2022 under the No-build Condition using PM peak 15-minute exits.

Table 4-4: Projected Maximum 15-Minute Metrorail Passenger Loads at Franconia-Springfield Metro Station

Franconia - Springfield	Unit
2014 Maximum 15-minute Passengers (outbound exiting passengers during PM peak period)	486
2022 Passengers with Background Growth	572
2022 Development Projects (Passengers)	8
2022 Total No-build Passengers	**580**
2022 Minimum Trains [a]	2
2022 Train Cars [b]	14
2022 Maximum Passengers Per Car	**41**

[a] A 6-minute headway equates to 2.5 trains every 15 minutes. This figure was rounded down to 2 minutes to provide the most conservative load estimate.
[b] Assuming one 8-car train (Blue line) and one 6-car train at Franconia-Springfield.
Source: WMATA (2014b); MWCOG (2015); Springfield Site Transportation Agreement (Appendix E1)

4.4.2.4 Station Capacity Analysis

A capacity analysis was conducted for the vertical elements (escalators and stairs), faregate aisles, fare vending machines, and platforms at the Franconia-Springfield Metro Station. The analysis used peak 15-minute periods of ridership (entries and exits) at the station according to projected 2022 No-build Condition ridership. No-build Condition 2022 ridership includes projected regional transit growth of 2.1 percent per year at the station and planned development trips.

Volume-to-capacity (v/c) ratios were calculated for the vertical elements and fare elements, and pedestrian LOS was calculated for the platform areas. Table 4-5 summarizes ridership growth during the PM peak exiting periods at the station.

Table 4-5: Weekday Peak 15-Minute Exiting Period Ridership Growth

Metro Station	Time	2014		2022 No-build	
		Entries	Exits	Entries	Exits
Franconia-Springfield	5:00 PM – 5:15 PM	82	486	138	581

Source: WMATA (2014b); MWCOG (2015)

Table 4-6 summarizes ridership growth during the AM peak entering period at the station.

Table 4-6: Weekday Peak 15-Minute Entering Period Ridership Growth

Station	Time	2014		2022 No-build	
		Entries	Exits	Entries	Exits
Franconia-Springfield	7:30 AM – 7:45 AM	445	41	530	89

Source: WMATA (2014b); MWCOG (2015)

Table 4-7 summarizes the results of the station capacity analysis, including the vertical elements, fare elements, and platforms. Further details on the station capacity analysis are found in Appendix E3.

Table 4-7: 2022 No-build Condition Franconia-Springfield Metro Station Capacity Analysis Summary

Element		Volume to Capacity (V/C) Ratio
Mezzanine/ Platform	Entry Escalators	0.07
	Exit Escalators	0.25
	Stairs	0.17
Faregate Aisles		0.18
Fare Vending		0.14
Platform Peak LOS		B

Source: WMATA (2014b); Station Site Inventory (December 2014)

Overall, vertical elements, faregate aisles, and fare vending machines at the station are projected to operate within capacity, or below a v/c of 0.7, which is considered capacity. Additionally, platform peak pedestrian levels of service (based on the available spacing between passengers) on the busiest platform sections are projected to be at the acceptable LOS B. Further details on the station capacity analysis are found in Appendix E3.

4.4.2.5 NFPA 130 Emergency Evacuation Analysis

An emergency evacuation analysis was conducted to compare evacuation capacity of the Franconia-Springfield Metro Station to standards set by the NFPA 130 code (TRB 2013). NFPA 130 requires that station platforms be fully evacuated within 4 minutes and that all passengers reach a point of safety within 6 minutes. WMATA Metrorail Stations, however, are not required to meet these criteria. Details on the assumptions and calculations necessitated in NFPA 130 are found in Appendix E4. A summary of the emergency evacuation analyses is included below, with further details of the station analysis included in Appendix E4.

The NFPA 130 analysis used the projected number of passengers waiting to board and alight trains (entries and exits) from the peak 15-minute period (5:00 PM to 5:15 PM) at the station. The previous table 4-7 summarizes the volume of passengers entering and exiting the station during this period.

Using the peak 15-minute ridership period and NFPA 130 assumptions and guidelines, the platform at the Franconia-Springfield Metro Station could be evacuated in 2.3 minutes, and the entire station could be evacuated to a point of safety within 7.1 minutes.

4.4.3 Bus Analysis

For this analysis, it was assumed that there would be no major changes in bus service in the study area by 2022. (May 2015 service changes noted below did not add capacity to any routes in the study area). The analysis

includes Metrobus and Fairfax Connector routes that serve the study area because data were available for both systems.

To calculate peak hour bus volumes within the study area, the 2014 maximum weekday passenger loads for each route and direction at stops within the study area were averaged by stop, and then this figure was multiplied by the number of peak bus trips per hour to calculate ridership per peak hour by route and direction. These totals were then grown to the year 2022 using the 1.9 percent annual regional growth rate for the bus mode. The 2022 totals were then summed to calculate a total ridership per peak hour for the study area.

As noted in *Projected Transit Growth* section (Section 4.4.1), 57 percent of the peak hour non-SOV project trips were used as the starting point to determine bus trips associated with the Springfield Metro Center project. The peak hour non-SOV trips associated with the Springfield Metro Center development were disaggregated into peak hour bus trips using the bus mode proportion from the 2009-2013 American Community Survey means of transportation data (U.S. Census Bureau 2009-2013) for the census tract containing the development. This additional ridership, approximately 27 AM peak and 25 PM peak passenger trips (see table 4-8), was added to each route and direction proportionally based on existing ridership.

Table 4-8: Projected Bus Trips Associated with Springfield Metro Center Project

Period	Springfield Metro Center Total Non-SOV Trips Per Hour			Bus Proportion of Non-SOV	Bus Passenger Trips Per Hour		
	IN	OUT	TOTAL		IN	OUT	TOTAL
AM Peak Hour	292	40	332	8.0%	23	3	27
PM Peak Hour	52	254	307	8.0%	4	20	25

Note: Values may not appear to calculate correctly due to rounding.
Source: WMATA (2014d); Springfield Site Transportation Agreement (Appendix E1); U.S. Census Bureau (2009-2013)

To calculate the peak hour capacity of bus services within the study area, the capacity per trip of each bus route during the peak hour was multiplied by the number of trips scheduled in the peak hour. Capacities per trip for each Metrobus route were based on the typical number of seats available on each trip and the WMATA load standard (WMATA 2013c). Capacities per trip for each Fairfax Connector route were also based on the typical number of seats available on each trip and the Fairfax Connector load standard (Fairfax County 2014e).

Total 2014 peak hour bus ridership (Existing Condition) and projected 2022 peak hour bus ridership (No-build Condition) are summarized in table 4-9. Both 2014 and No-build Condition 2022 bus ridership are below the calculated overall capacity of bus services in the study area, meaning the additional passenger trips projected can be adequately handled by current service levels. Additionally, no individual routes are projected to have capacity issues by 2022.

Table 4-9: Current and Projected Bus Ridership in the Springfield Study Area

Measure	2014		2022 Background Growth		2022 Planned Development Projects		2022 Total No-build	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Total Volume	760	758	881	879	27	25	908	904
Total Capacity	2,459	2,441	2,459	2,441	-	-	2,459	2,441
Volume to Capacity Ratio (V/C)	0.31	0.31	0.36	0.36	-	-	0.37	0.37

Sources: WMATA (2014d); Fairfax County (2015a); MWCOG (2015); Springfield Site Transportation Agreement (Appendix E1)

4.4.3.1 Franconia-Springfield Metro Station Bus Bays

Currently, the Franconia-Springfield Metro Station bus loop has a total of eight bus bays, all of which are occupied by WMATA, Fairfax Connector, or PRTC routes (WMATA 2015b). Three new bus bays are planned for construction by 2016 as part of a TIGER-funded station improvement project, bringing the total number of bus bays at the station to 11 (WMATA 2015e). WMATA standards call for a maximum of six buses per hour per bay (WMATA 2008b). The maximum acceptable capacity (based on a 2-minute loading/unloading time and a 2-minute layover time), however, is 12 buses per hour (WMATA 2013b). Currently, the station has 70 buses per hour, which is higher than WMATA's standard capacity of 66 buses per hour with 11 bays, but less than the maximum acceptable capacity of 132 buses per hour with 11 bays. Table 4-10 summarizes the Franconia-Springfield Metro Station No-build Condition bus loop capacity analysis. Further details on the Metrobus capacity analysis are found in Appendix E6.

Table 4-10: Franconia-Springfield Metro Station No-build Condition Bus Loop Capacity Analysis

Year/Condition	Buses Per Hour	Bus Bays	Standard Capacity (Buses Per Hour)	Maximum Acceptable Capacity (Buses Per Hour)
2014 Existing	70	8	48	96
2022 No-build	70	11	66	132

Sources: WMATA (2008b, 2013b, 2015b, 2015e)

4.4.4 Level of Impact

The increase in public transit trips in the No-build Condition would have the following impacts on transit:

- No Metrobus routes or Fairfax Connector routes would have capacity issues. Additionally, the overall capacity of bus services in the study area would accommodate the projected ridership.
- Metrorail passenger loads through the study area are projected to remain at acceptable levels.
- Metrorail vertical elements are projected to continue to operate below capacity.
- Metrorail faregate aisles and fare vending machines would continue to operate below capacity.

- Metrorail platform peak pedestrian LOS (based on the available spacing between passengers) on the busiest platform sections are projected to continue to be at the acceptable LOS B.

- Platform and station evacuation times would increase slightly over existing conditions. Platform evacuation times would continue to meet NFPA 130 standards, while station evacuation times would continue to slightly exceed NFPA 130 standards. WMATA Metrorail stations, however, are not required to meet NFPA 130 standards.

The increase in public transit trips from nearby development projects and normal annual growth in transit ridership under the No-build Condition would not strain or bring the volume of the transit ridership above existing service level capacities. Therefore, the No-build Condition would have no measurable direct, long-term impacts to public transit capacity. However, bus operations (three bus routes) would have direct, long-term, major adverse impacts due to potential traffic delays along Franconia-Springfield Parkway (see Section 4.7 *Traffic Analysis*).

4.5 Parking

Parking in the study area would likely experience changes (see figure 4-5). Minimal changes are envisioned to public parking in the 0.5-mile area around the Springfield site through 2022. With the extension of Frontier Drive from Franconia-Springfield Parkway to Loisdale Road, however, on-street parking would be added (FCDOT 2012). Additionally, just outside of the 0.5-mile study area for parking, a Springfield Community Business District (CBD) Commuter Parking Garage would be built at Old Keene Mill Road and Springfield Boulevard (just west of Amherst Avenue) (FC OCR 2014b). The parking garage is planned to have more than 1,000 spaces to replace existing parking lots and spaces located in nearby shopping centers; it would act as a multi-modal center with multiple bus bays and be designed for sluggers (FC OCR 2014a).

Private parking areas in the study area would also likely increase. The Metro Center II project is planned to include the addition of a private parking garage for the project tenants southwest of the Springfield site. There may also be future parking changes at the Springfield Mall with future development phases of the mall.

The No-build Condition and improvement projects would slightly increase public surface parking along the Frontier Drive Extension. The addition of the area improvement projects would slightly increase the parking demand in the study area, but the on-site parking improvements and proximity of the projects to Metrorail should provide sufficient capacity for the extra trips generated from the development projects. Overall, with a slight increase in surface public parking, the No-build Condition would have direct, long-term, beneficial impacts on parking in the study area.

Figure 4-5: No-build Condition Planned Parking

4.6 Truck Access

Truck access routes would not change under the No-build Condition, with the exception that some trucks may take the extended Frontier Drive route to access the Springfield site and surrounding developments once that

road extension is completed. There would be direct, long-term, beneficial impacts to truck access due to the improved roadway connections under the No-build Condition.

4.7 Traffic Analysis

The No-build Condition includes various programmed transportation improvements in the study area, trips generated by approved and unbuilt development projects, and growth in existing traffic volumes through the same horizon year as the Build Condition or 2022. Volumes are then used as an input, along with delay, signal timing, and geometrics, to evaluate traffic operations and queueing at signalized and unsignalized intersections, and on freeways, to determine the impacts of traffic growth and potential mitigation measures.

According to the Springfield Site Transportation Agreement, two primary sources were relied on to develop the future traffic volumes: an approved list of planned developments provided by FCDOT and background growth rates agreed among by all parties (VDOT, FCDOT, and the EIS project team). The Springfield Site Transportation Agreement is found in Appendix E1.

The following section describes the process for analyzing traffic for the No-build Condition and the results of the analysis. Note that the procedures to forecast future traffic volumes throughout the TIA include rounding; therefore, values may not add up to the precise value indicated.

4.7.1 Background Growth

Background growth was added to the Interstate and non-Interstate roadway network to account for vehicle trips traveling through the study area during the AM and PM peak hours. These trips are important to include because they account for vehicle volume growth due to land use changes outside of the study area. Two sources were relied on to develop background growth rates. The MWCOG Travel Demand Model and the AADT volumes maintained by VDOT. The MWCOG travel demand forecasts, in close collaboration with local jurisdictions, provide consolidated, consistent future vehicle volume projections that support air quality modeling, traffic congestion forecasts, and general planning. The models are updated regularly as conditions change, but there is always some degree of lag. The AADT volumes provide a historic reference. VDOT recommends six years of historic data to determine a historical average growth.

Based on the Springfield Site Transportation Agreement that documents research performed by FCDOT (discussed below), the MWCOG Round 8.2 2025 land use forecasts (MWCOG included approximately 57 percent of all area planned developments, except for one planned development in the study area called Gramm Jennings Safford Automobile Dealership approved in 2014 (Springfield Site Transportation Agreement). Also agreed to in the Springfield Site Transportation Agreement were two additional development projects in the planned developments because of their proximity to the study site and the fact that their anticipated impact on the Frontier Road Extension was not previously captured or modeled, as described below.

FCDOT performed a recent study along U.S. Route 1 between Huntington and I-95 that developed a 0.58 average annual peak hour growth rate based on the MWCOG travel demand model (FCDOT 2015b). Based on the Springfield Site Transportation Agreement (Appendix E1), the level of development assumed in the MWCOG travel demand model best approximates the anticipated Springfield study area growth through year 2025; therefore, the 0.58 percent annual growth rate was agreed to for use in the Springfield study area. To avoid double-counting, the planned developments already covered in the MWCOG model were not included in the No-build Condition.

For the Interstate roadway network, Version 2.3.52 of the 2010 MWCOG model (the most recent base Condition) was compared to the 2025 (the first model run date after the proposed 2022 action Condition date) MWCOG model adopted in July, 2013 (MWCOG 2014). This was the most recent version of the model available for the FBI

HQ EIS project. Sample average daily traffic volumes were extracted from the MWCOG model for I-95 northbound and southbound between Fairfax County Parkway and the I-395/I-495 Interchange (also known as the Springfield Mixing Bowl). Based on the model data, the average annual growth was 0.9 percent, predominantly due to the projected volumes near Fairfax County Parkway (the southern end of the Springfield study area). Based upon the Springfield Site Transportation Agreement, a 0.75 percent annual growth was used for the Interstate roadways to reflect the next quarter of a percent lower than the average. This value considered the high projected annual growth (more than 1.7 percent) near Fairfax County Parkway while adjusting for the other projected annual growth samples near the Franconia Road and Mixing Bowl interchanges (0.5 percent). Table 4-11 shows the background growth rates by roadway facility. Figure 4-6 show the total No-build Condition background trips. See Appendix E7 for further details on the No-build Condition background growth.

Table 4-11: No-build Condition Background Roadway Growth Rates

Roadway	Annual Growth Rate	Eight-Year Growth
I-95/I-495/I-395	0.75%	6.16%
Non-Interstate Roadways	0.58%	4.74%

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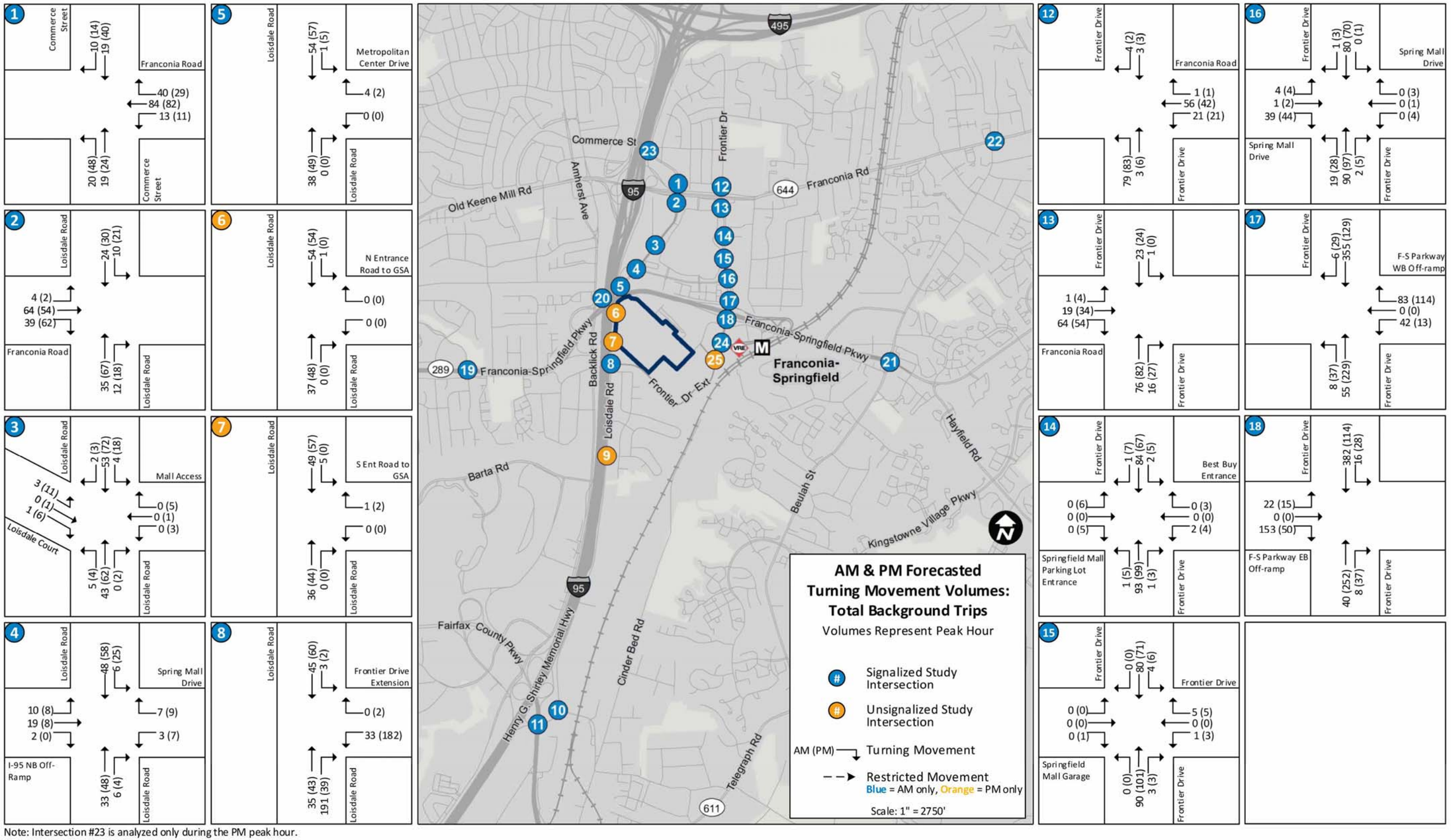
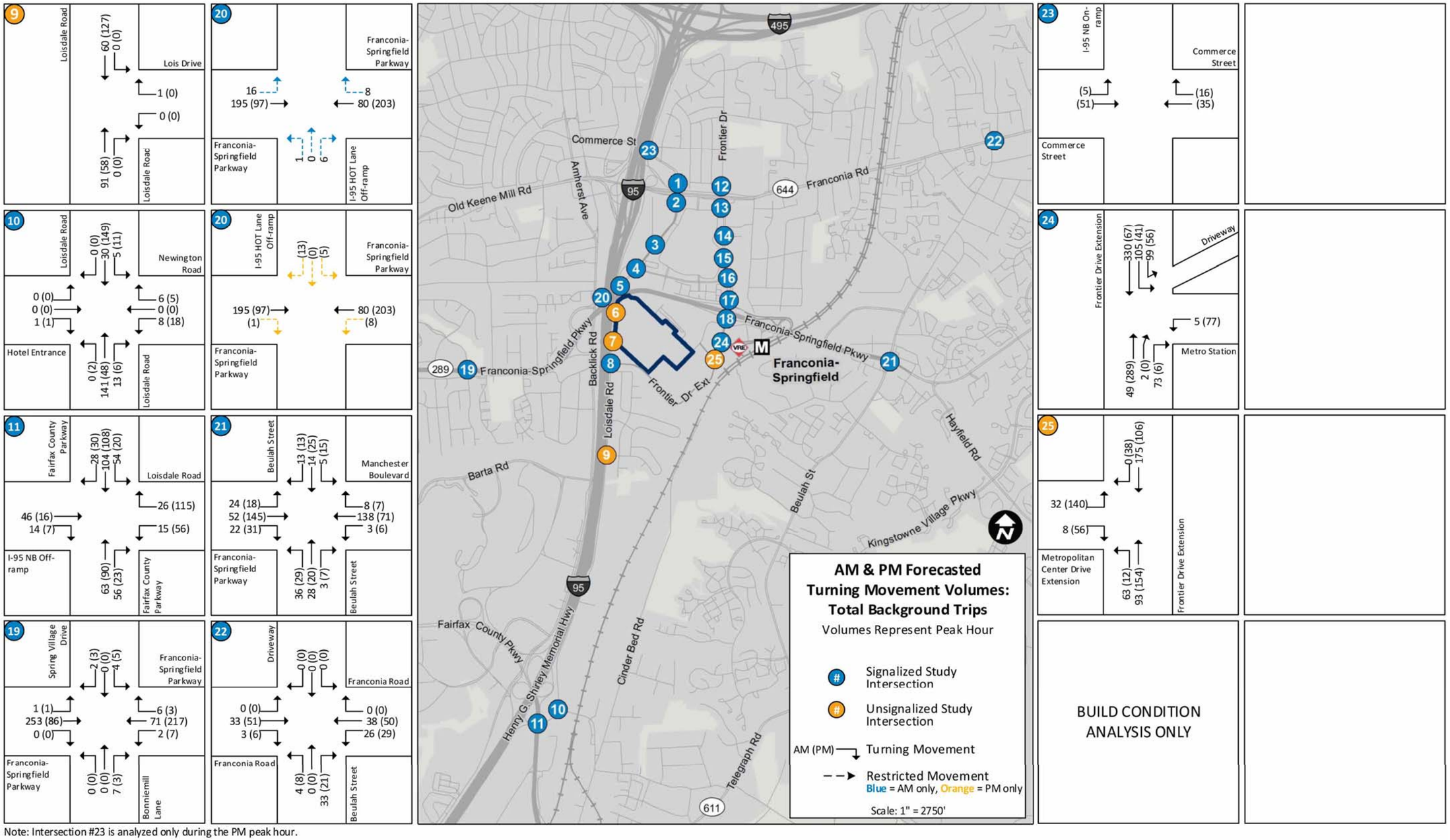
Figure 4-6: Total No-build Condition Background Trips



Note: Intersection #23 is analyzed only during the PM peak hour.

Figure 4-6: Total No-build Condition Background Trips



Note: Intersection #23 is analyzed only during the PM peak hour.

4.7.2 Trip Generation and Modal Split

The process to add each development to the No-build Condition was similar to the process outlined in the TIA reports for each development. When initially generated, all three reports relied on the ITE *Trip Generation Manual* (ITE 2012).The Safford Automobile Dealership planned development relied on the latest version of the ITE (9th Edition); however, the other two reports were published in 2008 and relied on an older version of the ITE *Trip Generation Manual*. ITE's 9th edition *Trip Generation Manual* was used for calculating trip generation for all three planned developments to ensure a consistent trip rate calculation.

Metro Center II Phase I and Phase II developments are located within 0.5 mile of the Springfield Metro Station. Fairfax County has established a Transportation Demand Management (TDM) trip reduction goal of 40 percent for Transit Oriented Development (TOD) locations between 0.25 and 0.5 mile from the nearest Metrorail station (Burke 2015). Therefore, the trips for both office developments were reduced by 40 percent to account for the county's trip reduction goals.

Background growth, discussed above, accounted for 57 percent of all area planned developments (except the Safford Automobile Dealership). Therefore, to avoid double-counting, the vehicle trips projected to be generated from the Springfield Metro Center II Phase I and Phase II developments were further reduced by 43 percent (100 percent minus 43 percent equals 57 percent) to match the MWCOG Round 8.2 land use (2025) projections. Trips entering and exiting all three developments were forecasted for both AM and PM peak time periods.

In addition to the planned development trip generation, the future vehicle trip growth for the Franconia-Springfield Metro Station was forecasted to 2022. The MWCOG travel demand model indicated a 2.07 annual growth rate for the Metro system. To be consistent with another proposed FBI HQ site located near an end-of-the-line metro station (Greenbelt Metro station) because WMATA approved a vehicle trip forecast as part of the study to redevelop the WMATA property (Renard Development Company 2014). Based on the approved WMATA property redevelopment growth rates, a 2.25 percent annual growth rate was selected for the Springfield study area to represent the average between the Greenbelt Metro station garage (1.5 percent) annual growth rate and the Greenbelt Metro station Kiss & Ride (3 percent) annual growth rate (Renard Development Company 2014). The 2.25 percent annual growth was applied to the existing total station vehicle volumes for both entering and exiting trips. The percent split for future trips (between inbound and outbound) is assumed to be consistent with current trips. The vehicle volumes were obtained from the Frontier Drive and Franconia-Springfield Parkway eastbound ramp intersection Existing Condition providing the volumes into and exiting the station from Frontier Drive. The 2012 Frontier Drive Extension Traffic Operational Analysis Final Report provided the existing volumes into and exiting the station from the ramp directly serving the Franconia-Springfield Parkway (FCDOT 2012).

Table 4-12 summarizes the steps used to forecast the Metrorail growth in vehicle trips.

Table 4-12: Metrorail Growth Forecast Steps

	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Frontier Drive	1,077	382	389	1,239
Franconia-Springfield Parkway	542	70	120	248
Total Vehicles per Access Road	1,619	452	509	1,487
Total Vehicle Volume	2,071		1,996	
Total Growth Forecasted	403		389	
Percent Split	78%	22%	25%	75%
Total Forecasted Growth	314	89	97	292
Total Forecasted Vehicle Trip Volume	1,933	541	606	1,779

Table 4-13 contains a summary of the planned development trip generation.

Table 4-13: Planned Development Trip Generation

PROJECT	SIZE / TRIPS / CREDITS	AM PEAK HOUR			PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Safford Automobile Dealership							
Automobile Sales (ITE - 841)	80,000 SF	116	38	154	71	106	177
TOTAL VEHICLE TRIPS		**116**	**38**	**154**	**71**	**106**	**177**
Springfield Metro Center II Phase I							
General Office (ITE - 710)	544,120 SF	653	89	742	117	571	688
Fairfax County TDM Trip Reduction Goal[a]	40% trip reduction	-261	-36	-297	-47	-228	-275
Net Vehicle Trips		392	53	445	70	343	413
Adjustment to background growth factor[b]	43% of total trips	-169	-23	-191	-30	-147	-178
Net External Trips (57% of total projected trips)		223	30	254	40	196	235
TOTAL VEHICLE TRIPS		**223**	**30**	**254**	**40**	**196**	**235**
[a] Fairfax County has a 40% upper range TDM goal to reduce vehicle trips for projects located 1/4 to 1/2 mile from a Metro station [b] Background growth accounted for 57% of development; therefore, 57% of generated trips were added to the site driveways							
Springfield Metro Center II Phase II							
General Office (ITE - 710)	517,600 SF	627	86	713	112	546	658
Fairfax County TDM Trip Reduction Goal[a]	40% trip reduction	-251	-34	-285	-45	-218	-263
Net Vehicle Trips		376	52	428	67	328	395
Adjustment to background growth factor[b]	43% of total trips	-162	-22	-184	-29	-141	-170
Net External Trips (57% of total projected trips)		214	30	244	38	187	225
TOTAL VEHICLE TRIPS		**214**	**30**	**244**	**38**	**187**	**225**
[a] Fairfax County has a 40% upper range TDM goal to reduce vehicle trips for projects located 1/4 to 1/2 mile from a Metro station [b] Background growth accounted for 57% of development; therefore, 57% of generated trips were added to the site driveways							
Franconia-Springfield Metro Station Background Growth							
Metro Growth at 2.25% Annual Growth	2.25% Annual Growth	314	89	403	97	292	389
TOTAL VEHICLE TRIPS		**314**	**89**	**403**	**97**	**292**	**389**

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4.7.3 Trip Distribution

Once the total number new vehicle trips were calculated through the trip generation process, the trips were systematically and logically distributed across the road network. This is typically a straightforward process, emulating the existing travel patterns on roadways. However, in this case, with new developments and new roadways introduced as part of the No-build Condition, the process required several additional steps to complete. These steps included:

1. Expand the existing volumes to cover the proposed future Franconia-Springfield Metro Station roadway network.
2. Shift the vehicle trips based on the opening of a new roadway connection (Frontier Drive Extension).
3. Add the planned development trips.
4. Add the Franconia-Springfield Metro station trips.
5. Add the background growth rate trips.

4.7.3.1 Distribution of Franconia-Springfield Metro Station-Generated Vehicle Trips on the Proposed Roadway Network

For the first step of expanding the existing vehicle volumes to cover the proposed future Franconia-Springfield Metro Station roadway circulation network, the existing vehicle volumes captured in the 2012 Frontier Drive Extension Traffic Operational Analysis Final Report were used (FCDOT 2012). The report provided the vehicle volume accessing the station from Franconia-Springfield Parkway and Frontier Drive, and provided the vehicle volume entering and exiting the parking garage at each ingress/egress point. From these ingress and egress volumes, a percentage was calculated for each garage entrance and exit by peak hour. Next, the total vehicle volume entering from Franconia-Springfield Parkway was added to the existing volumes entering from Frontier Drive to determine the total vehicle volume accessing the station. The first attempt to assign the vehicle volumes based on the garage entrance/exit percentages resulted in the proposed roundabout causing a substantial queue onto Franconia-Springfield Parkway. Therefore, the vehicle volumes were adjusted through engineering judgment to assign the volumes entering from Frontier Drive to the two garage entrances located along the southwestern corner (50/50 split), thus avoiding the roundabout. The remaining entrances located along the north and east sides were assigned to the Franconia Springfield Parkway entering volumes. For exiting volumes, the northwest corner exit was assigned the total volume destined to eastbound Franconia-Springfield Parkway because this would be the most logical exit for these vehicles to use. The remaining exits were assigned percentages close to the Frontier Drive Extension report. Appendix E7 contains the distributed trips on the Metrorail station roadway network.

4.7.3.2 Shifted Vehicle Trips Caused by Frontier Drive Extension

The opening of Frontier Drive Extension would create a shift in vehicle trips based on the new roadway connection providing quicker travel times. The FCDOT Frontier Drive Extension report provided origin/destination tables presenting vehicle volume for the AM and PM peak hour periods for the future condition without a Frontier Drive Extension or No-build and a condition with a Frontier Drive Extension or Build (FCDOT 2012). Based on the origin/destination tables, percentage shifts between the same origin/destination pairs were calculated between the No-build and Build Conditions. This was important to determine the decrease in volume along Franconia-Springfield Parkway from the west and I-95 from the south resulting from the shift to Loisdale Road from the south. The origin/destination tables were also used to calculate the percent of vehicle trips to/from Frontier Drive to the north, NVCC, and Metropolitan Center Drive that shifted to the proposed Frontier Drive Extension from Loisdale Road and Spring Mall Drive. The calculated percentages were then applied to the appropriate existing volumes to calculate an estimate of vehicles shifting their routes. Tables 4-14 and 4-15 contain the AM and PM

peak hour vehicle shifts, respectively. Figure 4-7 shows the shifted trip patterns. Figure 4-8 and Appendix E7 show the net shifted existing trips.

Table 4-14: AM Peak Hour Vehicle Shifts

Location of Vehicle Shift	Percent	Existing Volume	Shifted Volume	Shifted Volume Source
Loisdale Road from the south to Metro Station	27%	403	**109**	Loisdale Road NB north of FCP
I-95 Northbound off-ramp at Spring Mill Road to Metro Station	-13%	264	**-34**	I-95 off-ramp to Spring Mall Road
FSP from the West to Metro Station (Remainder of trips after subtracting the I-95 Northbound off-ramp)	N/A	NA	**-75**	N/A
Frontier Drive from the north to Loisdale Road to the South	12%	66	**8**	Right turn from Frontier Drive to Spring Mall Road
FSP from the east to NVCC	9%	115	**10**	Left turn from Loisdale Road to Springfield Center Drive
FSP from the west to NVCC	11%	115	**13**	Left turn from Loisdale Road to Springfield Center Drive
Frontier Drive from the north to NVCC	16%	115	**18**	Left turn from Loisdale Road to Springfield Center Drive
NVCC to FSP to the east	1%	13	0	Right turn from Springfield Center Drive to Loisdale Road
NVCC to FSP to the west	1%	13	0	Right turn from Springfield Center Drive to Loisdale Road
NVCC to Frontier Drive to the north	21%	13	**3**	Right turn from Springfield Center Drive to Loisdale Road
Metropolitan Center Townhouses to Frontier Drive to the north	14%	118	**17**	Right turn from Metropolitan Center Drive to Loisdale Road
Metropolitan Center Townhouses to FSP to the east	8%	118	**9**	Right turn from Metropolitan Center Drive to Loisdale Road
FSP from the east to Metropolitan Center Drive	10%	44	**4**	Left turn from Metropolitan Center Drive to Loisdale Road
FSP from the west to Metropolitan Center Drive	6%	44	**3**	Left turn from Metropolitan Center Drive to Loisdale Road
Frontier Drive from the north to Metropolitan Center Drive	18%	44	**8**	Left turn from Metropolitan Center Drive to Loisdale Road
Acronyms: FCP – Fairfax County Parkway, FSP – Franconia-Springfield Parkway, NVCC – Northern Virginia Community College				

Table 4-15: PM Peak Hour Vehicle Shifts

Location of Vehicle Shift	Percentage	Existing Volume	Shifted Volume	Shifted Volume Source
Metro Station to Loisdale Road south	9%	567	**51**	Loisdale Road SB north of FCP
Metro Station to FSP to the West (vehicle trips removed)	N/A	N/A	**-51**	N/A
FSP from the east to Newington Road	2%	250	**5**	Left turn from Loisdale Road to Newington Road
FSP from the east to Loisdale Road south	1%	567	**6**	Loisdale Road SB north of FCP
FSP from the east to Metropolitan Center Townhouses	10%	147	**15**	Left turn from Loisdale Road to Metropolitan Center Drive
From Metropolitan Center Drive to FSP to the east	9%	72	**6**	Right turn from Metropolitan Center Drive to Loisdale Road
FSP from the east to NVCC	2%	57	**1**	Left turn from Loisdale Road to Springfield Center Drive
NVCC to FSP to the east	15%	62	**9**	Right turn from Springfield Center Drive to Loisdale Road
Frontier Drive from the north to Metropolitan Center Townhouses	9%	147	**13**	Left turn from Loisdale Road to Metropolitan Center Drive
From Metropolitan Center Drive to Frontier Drive to the north	22%	72	**16**	Right turn from Metropolitan Center Drive to Loisdale Road
NVCC to Frontier Drive to the north	10%	62	**6**	Right turn from Springfield Center Drive to Loisdale Road
Frontier Drive from the north to NVCC	12%	57	**7**	Left turn from Loisdale Road to Springfield Center Drive

Acronyms: FCP – Fairfax County Parkway, FSP – Franconia-Springfield Parkway, NVCC – Northern Virginia Community College

Figure 4-7: Shifted Trip Patterns

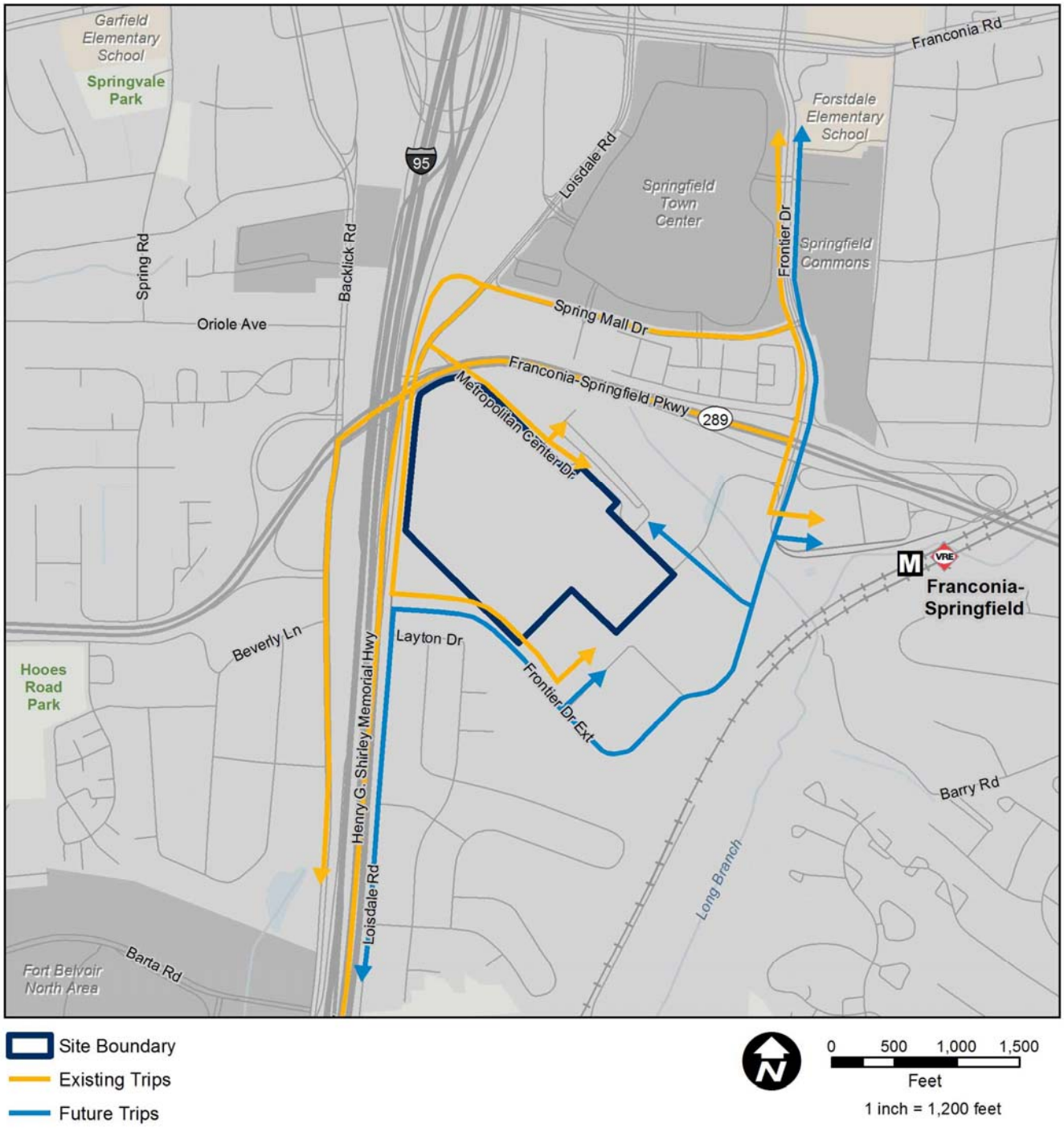
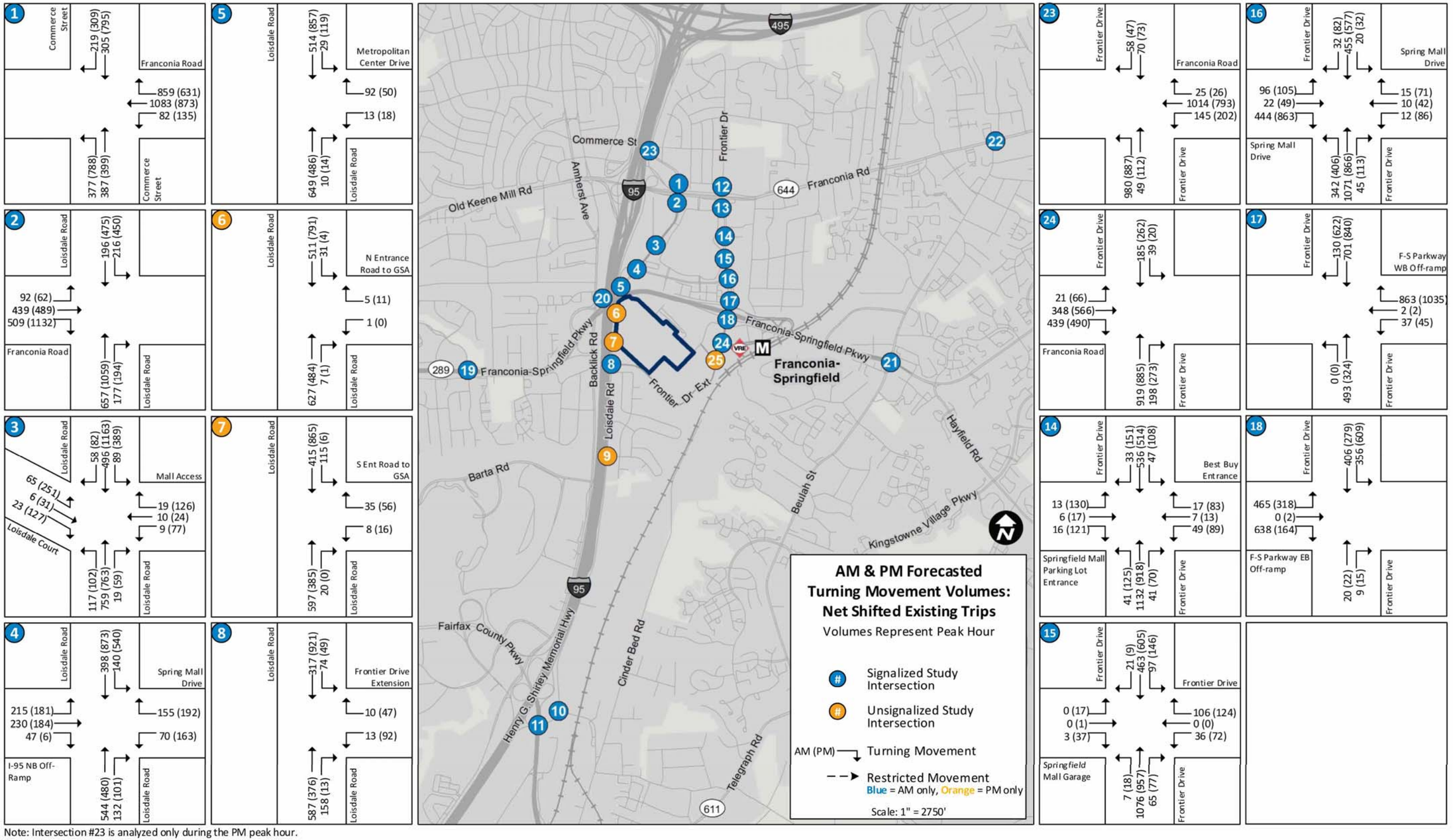
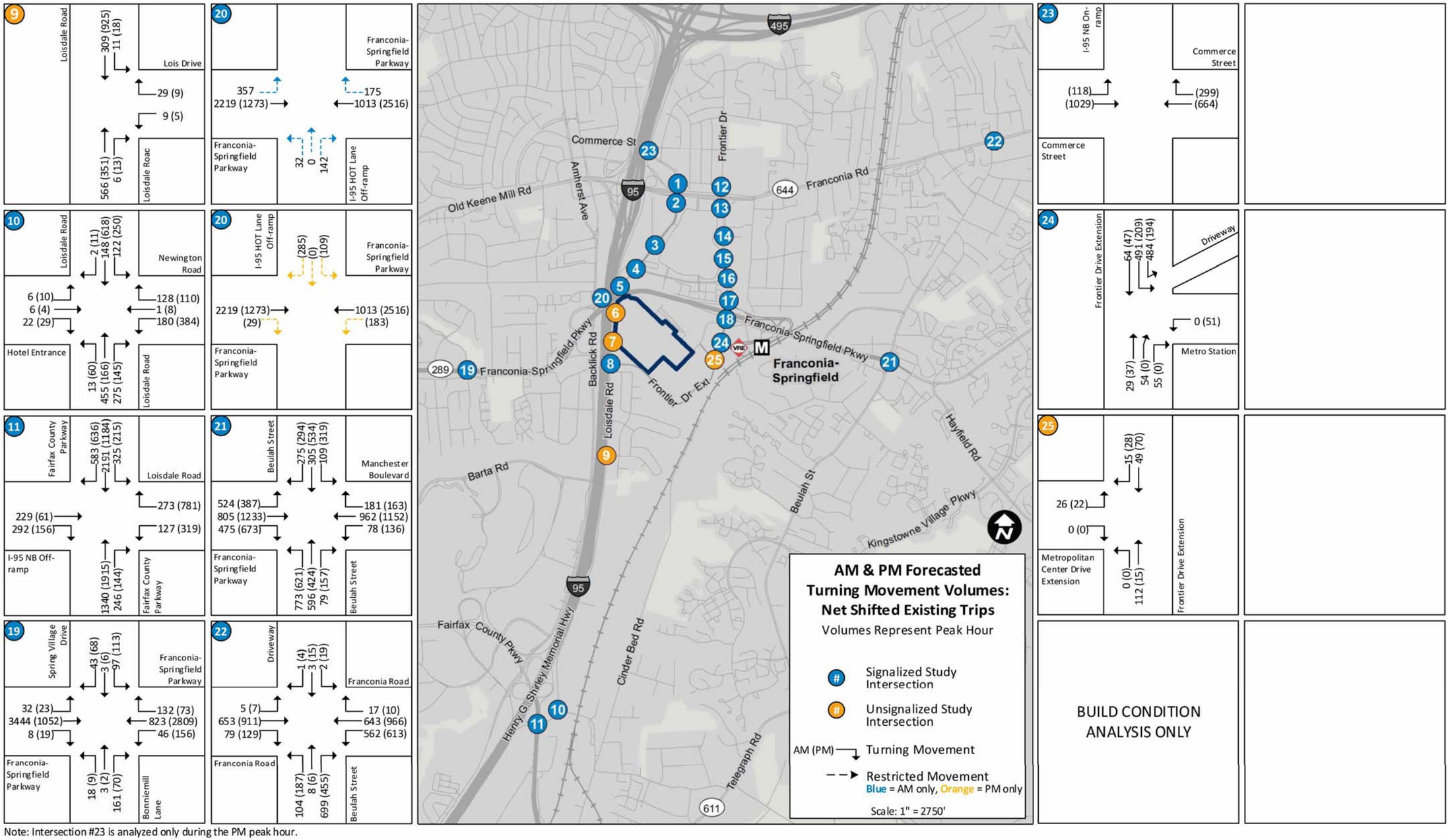


Figure 4-8: Net Shifted Existing Trips



Note: Intersection #23 is analyzed only during the PM peak hour.

Figure 4-8: Net Shifted Existing Trips (continued)



Note: Intersection #23 is analyzed only during the PM peak hour.

4.7.3.3 *Planned Development Trip Distribution*

The planned developments include the Safford Automobile Dealership and Springfield Metro Center II Phase I and II. The study followed the Safford Automobile Dealership Traffic Impact Study distribution pattern (GS 2013). Because 25 percent of vehicle distribution was assigned to Loisdale Road north of Spring Mall Drive, the Springfield Mall Town Center Traffic Impact Study retail distribution pattern was referenced to distribute 25 percent of vehicle trips across the remaining study area roads north of Springfield Mall Drive in a consistent manner (Wells & Associates Inc. 2008).

The study distributed the Springfield Metro Center II projects by using the Springfield Mall Town Center Traffic Impact Study office distribution pattern (Wells & Associates Inc. 2008). Vehicle trips from these developments were only added to the study area along Frontier Drive Extension between Loisdale Road and Franconia-Springfield Parkway westbound on/off ramps. These vehicle trips fill a gap in the future vehicle trip network (Frontier Drive Extension) while the 0.58 percent background growth covers the Springfield Metro Center II project for the remaining study area network. Table 4-16 contains the distribution percentages for each planned development. Appendix E7 contains maps showing the distribution patterns for each planned development.

Table 4-16: Planned Development Trip Distribution

Origin/Destination	Safford Automobile Dealership	Springfield Metro Center II Phase I & II
I-95 North	1%	56% [a]
I-395 North	1%	
I-495 North	2%	
Commerce Street	4%	
Frontier Drive	1%	
Franconia Road EB	7%	
Old Keene Mill Road	9%	
Franconia-Springfield Parkway eastbound	7.5%	7.5%
Franconia-Springfield parkway westbound	7.5%	7.5%
I-95 South	20%	29% [b]
Fairfax County Parkway eastbound	25%	
Fairfax County Parkway westbound	15%	
Total	100	100%

[a] Represents all vehicle trips destined to the north of the property excluding Franconia-Springfield Parkway
[b] Represents all vehicle trips destined to the south of the property

4.7.3.4 *Distribution of Future Forecasted Vehicle Trips to/from Metro Station*

The Franconia-Springfield Metro station forecasted future trips were distributed according to the FCDOT Frontier Drive Extension report AM Build origin/destination tables (FCDOT 2012). This was because the PM Build origin/destination tables were different and did not reflect the same shift in vehicle trips from Franconia-Springfield Parkway to Loisdale Road for I-95 southbound destinations. Therefore, the AM distributions were used for the PM peak hour forecasts, requiring the inbound and outbound percentages to be “flipped” to reflect the reverse pattern for the PM peak hour. In addition to the 16 percent assigned to the Loisdale Road South destination, the 3.0 percent vehicle trips from I-95 South during the AM peak hour were added to represent the reverse move to I-95 South during the PM peak hour. This result in 19 percent destined to Loisdale Road South. Table 4-17 contains the metro station distributions. Appendix E7 contains a map showing the distributions.

Table 4-17: Franconia-Springfield Metro Station Trip Distribution

Origin/Destination	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
I-95 South	3%	0%	0%	0%
Franconia-Springfield Parkway Eastbound	27%	12%	12%	27%
Franconia-Springfield Parkway Westbound	26%	33%	33%	26%
Frontier Drive	19%	45%	45%	19%
Spring Mall Road	3%	4%	4%	3%
Northern Virginia Community College	3%	3%	3%	3%
Metropolitan Center Drive	3%	3%	3%	3%
Loisdale Road South	16%	0%	0%	19% [a]
Total	100%	100%	100%	100%

[a] Represents the 16 percent during the AM plus the 3 percent from I-95 South shifted to Loisdale Road South

The total volumes by peak hour were multiplied by the projected 2.25 percent annual growth to calculate the station's forecasted growth through 2022. See table 4-11 for a summary of the total vehicle volumes serving the existing station.

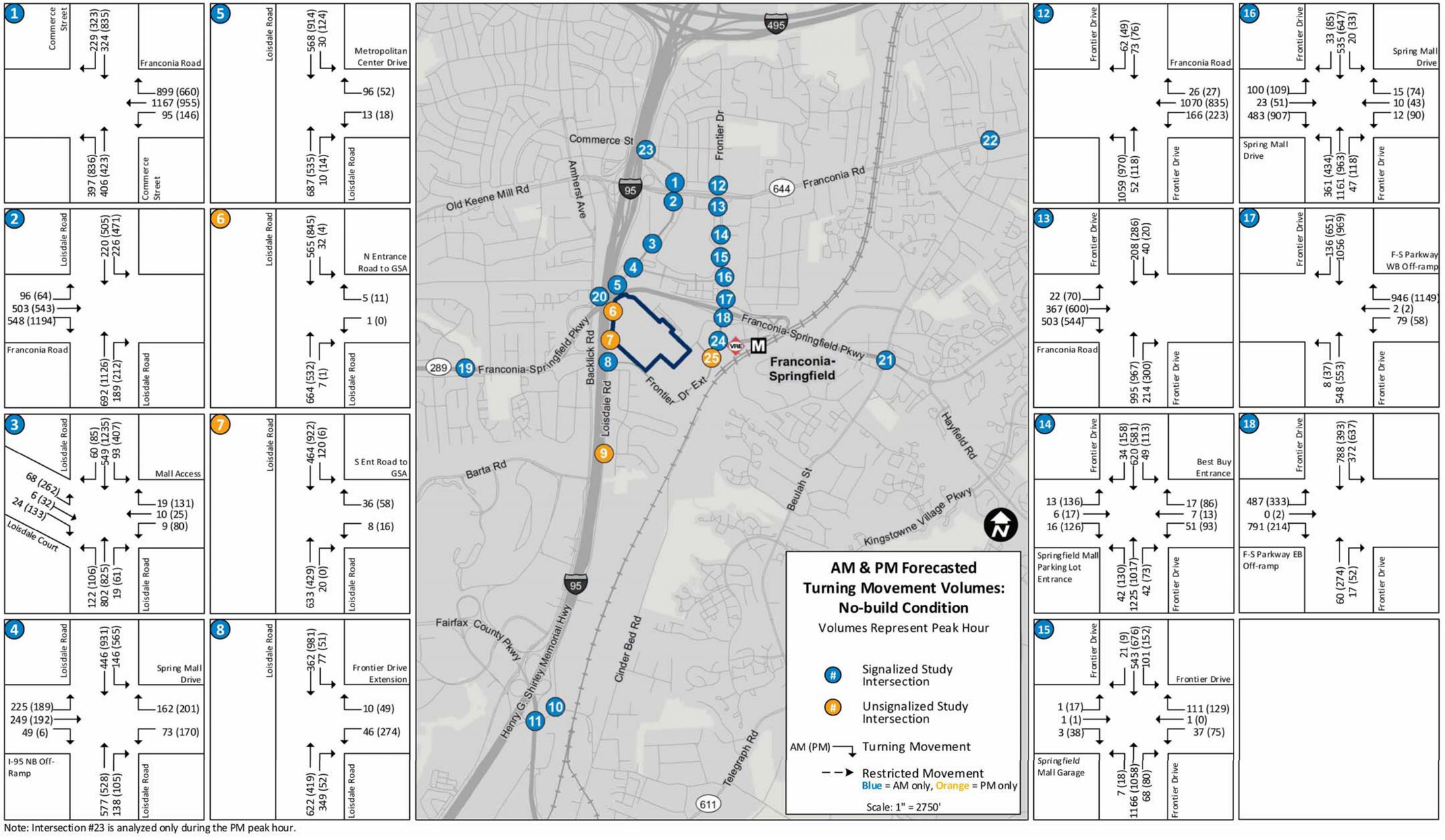
Lastly, once all the vehicle trips were properly shifted and the planned development growth applied, the vehicle background growth trips were applied. This consisted of applying a 0.58 annual growth factor to all the non-interstate roadways (including ramps) based on the volume after shifting existing vehicle trips due to the opening of the Frontier Drive Extension and applying a 0.75 annual growth factor to all the interstate roadways.

4.7.4 Development of No-build Condition

The planned developments, background growth, and planned roadway improvements were summed together to create complete No-build Condition vehicle volumes covering all study area intersections and expressway facilities. Figure 4-9 shows the total No-build Condition background AM and PM weekday peak turning movement volumes. Appendix E7 contains the individual planned developments and background growth turning movement volumes.

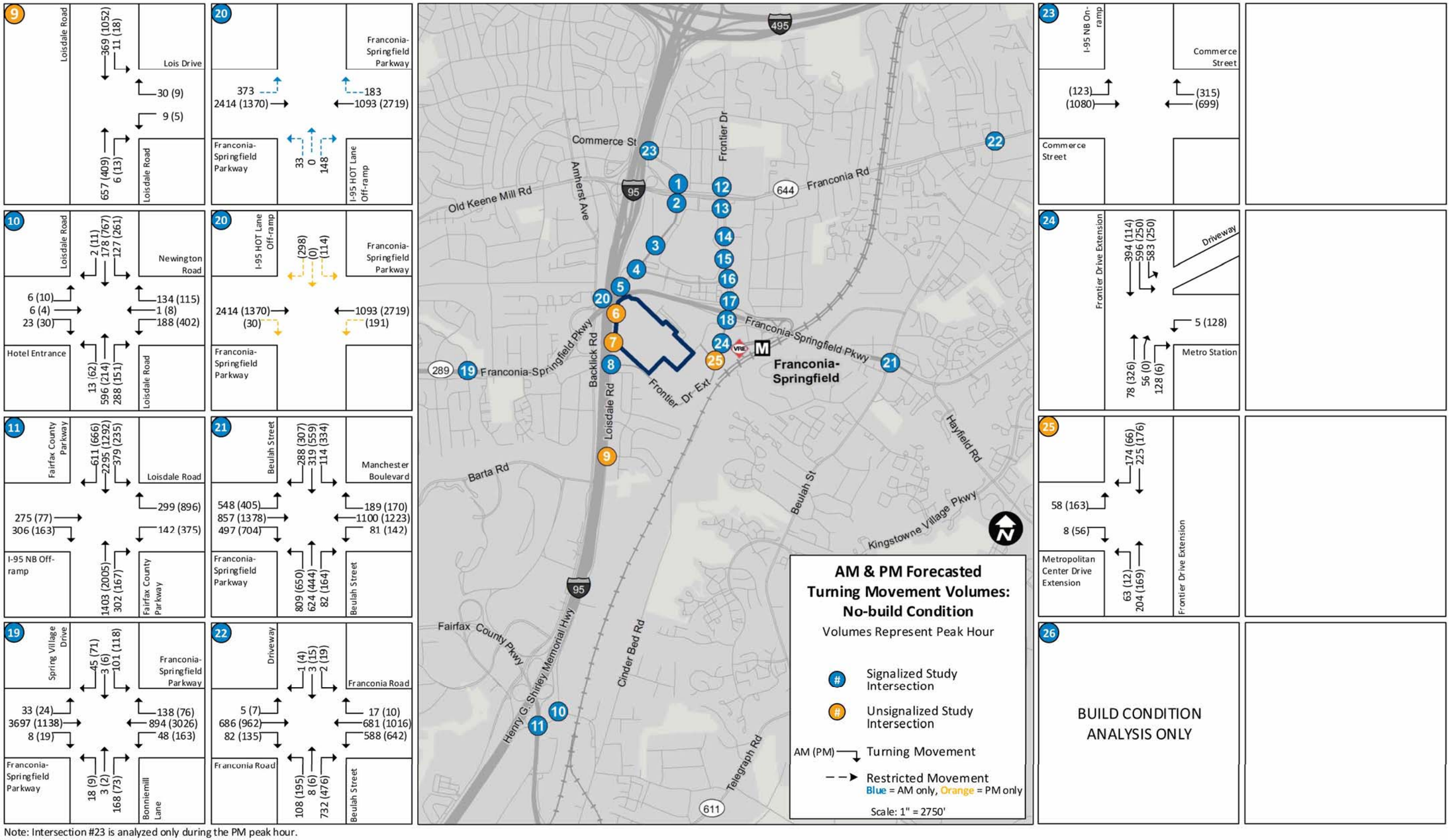
The PHF is used to convert 60-minute volumes into peak 15-minute volumes because the HCM traffic operations analysis procedures require a 15-minute peak volume. The PHF is the ratio of the 60-minute volume divided by 4 times the highest 15-minute volume in the peak hour of the day. All transportation facilities in the study area were evaluated based on a peak hour factor (PHF) of 0.92. The study uses the lowest accepted value following the VDOT requirement that all future facility traffic evaluation use a PHF between 0.92 and 1.00 to be consistent for all three sites, and to use the most conservative value for the analysis of future facilities (VDOT 2012b). Since the HCM 2000 traffic analysis is based on a 15-minute period, a PHF of 0.92 represents an analyzed vehicle volume based on the highest 15-minute vehicle volume. As a comparison, a PHF of 1.0 represents an analyzed vehicle volume based on a uniform 15-minute vehicle volume or the least conservative.

Figure 4-9: No-build Condition AM and PM Weekday Peak Turning Movement Volumes



Note: Intersection #23 is analyzed only during the PM peak hour.

Figure 4-9: No-build Condition AM and PM Weekday Peak Turning Movement Volumes (continued)



Note: Intersection #23 is analyzed only during the PM peak hour.

4.7.5 No-build Condition Operations Analysis

As noted in Section 3.7.1, intersections within the Franconia-Springfield District of the Fairfax County Comprehensive Plan (2013) that operate at LOS E should be considered to have acceptable or passing operations. Study area intersections outside of the Franconia-Springfield District are guided by the standard LOS guidelines where intersections operating at LOS E or LOS F are considered failing or unstable conditions. This Franconia-Springfield District does not include the following signalized study area intersections: Loisdale Road and Newington Road (#10), Loisdale Road and Fairfax County Parkway (#11), Franconia-Springfield Parkway and Spring Valley Drive (#19), I-95 HOT off-ramps to Franconia Springfield Parkway (#20), Franconia-Springfield Parkway and Beulah Street (#21), and Franconia Road and Beulah Street (#22).

4.7.5.1 Signalized Intersection Operations Analysis

Based on the Synchro™ signalized intersection analysis, most of the signalized study area intersections would operate at acceptable overall conditions during the morning and afternoon peak hours. However, the intersection of Franconia-Springfield Parkway/Manchester Boulevard and Beulah Street (Intersection #21) would operate at LOS F (average control delay exceeds 80 seconds) during both the AM and PM peak hours.

The following individual signalized intersection lane groups or overall approaches would operate under unacceptable conditions (LOS E or LOS F) during the morning or afternoon peak hours. The lane group within the approach that would operate under unacceptable conditions is noted in parentheses; when "overall" is noted, the overall approach movements would operate under unacceptable conditions.

- Loisdale Road/Commerce Street and Franconia Road (Westbound) (Intersection #1)
  - Westbound Franconia Road (left turns) during both the AM and PM peak hours
- Loisdale Road and Ramp from NB I-95/Spring Mall Drive (Intersection #4)
  - Westbound Spring Mall Drive (overall) during the AM peak hour
- Loisdale Road and Hotel Entrance/Newington Road (Intersection #10)
  - Westbound Newington Road (combined left and through movements) during the PM peak hour
- Loisdale Road/I-95 (N) Ramp C & D & Fairfax County Parkway (Intersection #11)
  - Eastbound I-95 Northbound off-ramp (overall), westbound Loisdale Road (overall), and southbound Fairfax County Parkway (left turns) during the AM peak hour
  - Eastbound I-95 Northbound off-ramp (through movements), westbound Loisdale Road (left turns), and southbound Fairfax County Parkway (left turns) during the PM peak hour
- Frontier Drive and Best Buy/Springfield Mall Parking Lot Entrance (Intersection #14)
  - Eastbound Springfield Mall parking lot entrance (left turns), westbound Best Buy entrance (overall), and northbound and southbound Frontier Drive (left turns on both approaches) during the AM peak hour
  - Northbound Frontier Road (left turns) at the same intersection during the PM peak hour
- Frontier Drive and Home Depot/Springfield Mall Garage Entrance (Intersection #15)
  - Eastbound Springfield Mall garage entrance (left and through movements), westbound Home Depot entrance (overall), and northbound and southbound Frontier Drive (left turns on both approaches) during the AM peak hour
  - Northbound and southbound Frontier Drive (left turns on both approaches) during the PM peak hour
- Frontier Drive and Spring Mall Drive (Intersection #16)
  - Westbound Spring Mall Road (overall) and southbound Frontier Drive (left turns) during the AM peak hour
- Frontier Drive and Franconia-Springfield Parkway (Eastbound) (Intersection #18)
  - Eastbound Franconia-Springfield Parkway (Eastbound) off-ramp (overall) during the AM peak hour

    - Eastbound Franconia-Springfield Parkway (Eastbound) off-ramp (left and through movements) during the PM peak hour
- Franconia-Springfield Parkway and Spring Village Drive/Bonniemill Lane (Intersection #19)
    - Eastbound Franconia-Springfield Parkway (left turns), westbound Franconia-Springfield Parkway (left turns), northbound Bonniemill Lane (overall), and southbound Spring Village Drive (overall) during both the AM and PM peak hours
- Franconia-Springfield Parkway/Manchester Boulevard and Beulah Street (Intersection #21)
    - Eastbound Franconia-Springfield Parkway (left turns), westbound Manchester Boulevard (overall), and northbound and southbound Beulah Street (both overall) during the AM peak hour
    - Eastbound Franconia-Springfield Parkway (overall), westbound Manchester Boulevard (overall), and northbound and southbound Beulah Street (both overall) at the same intersection during the PM peak hour
- Franconia Road and Beulah Street (Intersection #22)
    - Westbound Franconia Road (left turns) and the southbound driveway opposite Beulah Street (overall) during the AM peak hour
    - Eastbound Franconia Road (overall), westbound Franconia Road (left turns), northbound Beulah Street (left and through movements), and the southbound driveway opposite Beulah Street (overall) during the PM peak hour

4.7.5.2 Unsignalized Intersection Operations Analysis

Based on the unsignalized intersection analysis, all of the unsignalized intersections would operate at overall acceptable conditions during the AM and PM peak hours. The only individual unsignalized intersection approach that would operate at unacceptable conditions (LOS F) during peak hours would be the westbound approach on the south entrance road to the existing Springfield site (left turns) at the intersection of Loisdale Road and the southern entrances to the existing GSA facility during the AM peak hour.

4.7.5.3 Complete Intersection Operations Analysis

This section summarizes the differences in LOS impacts between the Existing Condition and the No-build Condition by quantifying the change in intersection operation failures. Following the summary, this section also includes the complete results of the operations analysis in both figures and a table.

Based on the Synchro™ signalized intersection analysis**,** a total of 11 signalized intersections and 1 unsignalized intersection would experience an unacceptable conditions for one or more turning movements. Compared to the Existing Condition, the No-build Condition would have no change in the number of intersections failing during both the AM and PM peak hours. In the AM peak hour, compared to the Existing Condition, there are zero intersections that passed overall but would now fail, 23 that would not change, and zero that were failing but would now pass. In the PM peak hour, there are zero intersections that passed overall but would now fail, 23 that would not change, and zero that were failing but would now pass.

Table 4-18 provides a summary of the number of intersections that meet the following criteria for the overall directional approach that would change between the Existing Condition and the No-build Condition:

- New Failing Approach
    - Number of intersections that have at least one failing overall approach that did **NOT** have a failing overall approach in the previous condition

- Additional Failing Approaches
    - Number of intersections that had at least one failing overall approach in the previous condition and now would have additional/more failing overall approaches than before

- No Change
    - Number of intersections that would have no change in the number of failing overall approaches, or the number of failing overall approaches would be the same as in the previous condition

- Fewer Failing Approaches
    - Number of intersections that would have less failing overall approaches than the previous condition, but still would have some failing overall approaches

- No Failing Approaches
    - Number of intersections that had failing overall approaches in the previous condition, but would no longer have failing overall approaches

Table 4-18: Intersection Operations Summary Comparing Existing Condition to No-build Condition

Type of Change Between Conditions	AM	PM
New Failing Approach	5	0
Additional Failing Approaches	1	0
No Change	16	19
Fewer Failing Approaches	0	0
No Failing Approaches	1	4
Total Signalized and Unsignalized Intersections Affected	**24**	**24**

The average LOS for the various approaches to the intersections and the overall intersection LOS grades for the No-build Condition are depicted in figures 4-10 and 4-11 for the AM and PM peak hours, respectively. Table 4-19 shows the results of the LOS capacity analysis and the intersection projected delay under the No-build Condition during the AM and PM peak hours.

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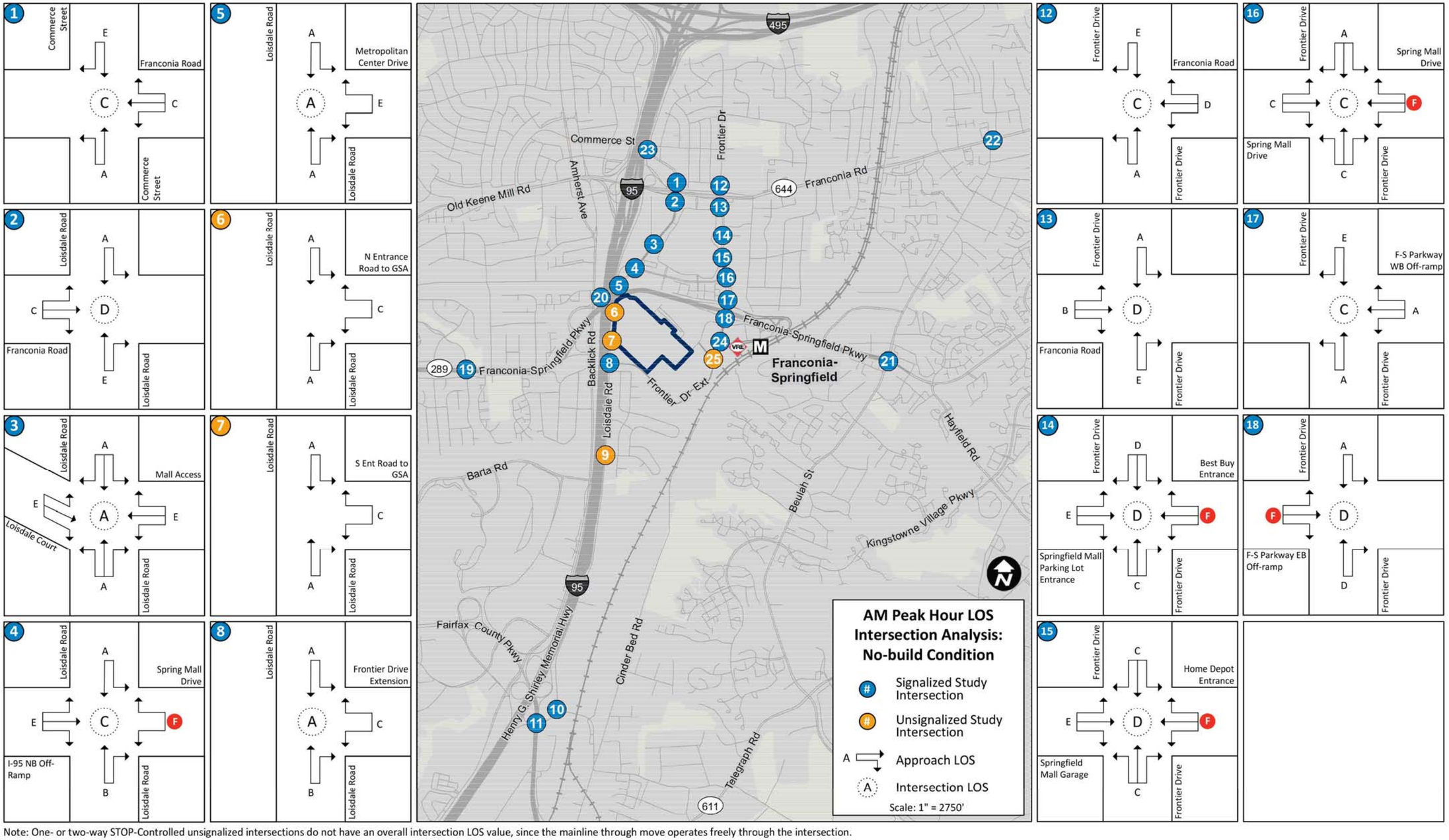
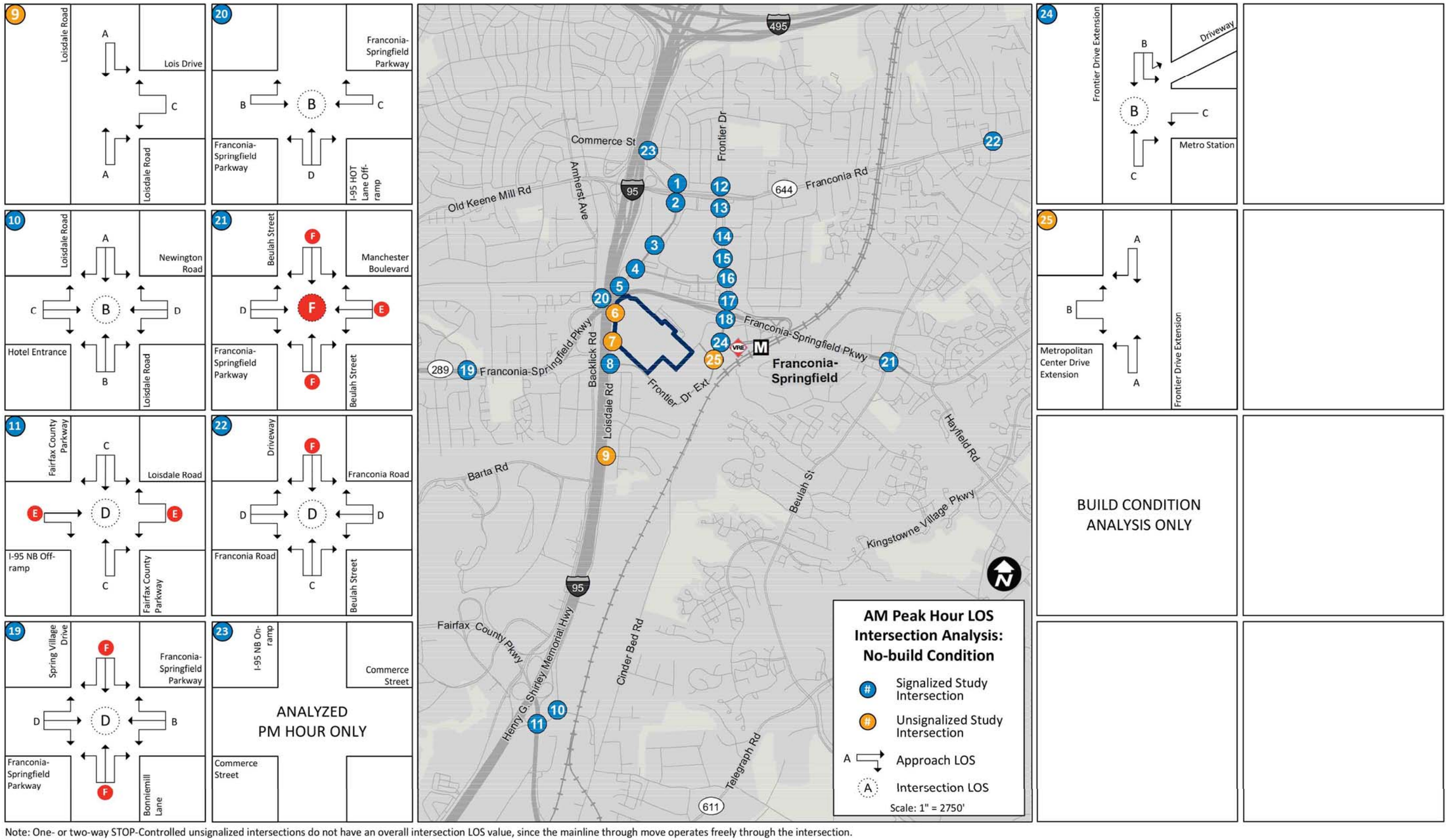
Figure 4-10: No-build Condition Intersection LOS for AM Peak Hour



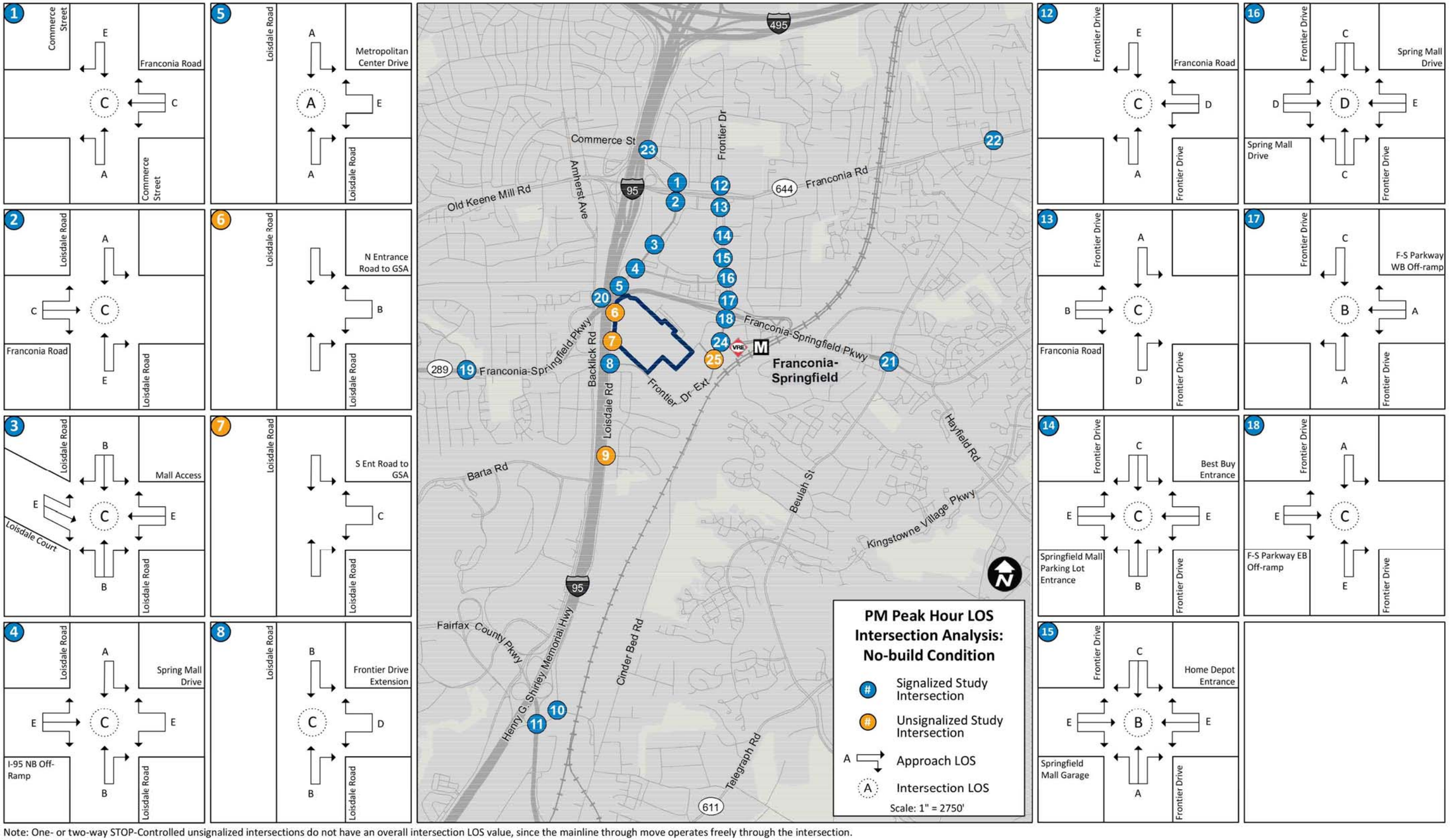
Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Figure 4-10: No-build Condition Intersection LOS for AM Peak Hour (continued)



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.

Figure 4-11: No-build Condition Intersection LOS for PM Peak Hour



Note: One- or two-way STOP-Controlled unsignalized intersections do not have an overall intersection LOS value, since the mainline through move operates freely through the intersection.
Red shaded circles denote intersections/approaches operating at unacceptable conditions (LOS F and, depending on intersection, also LOS E; see report text for more details).
Intersection #23 is analyzed only during the PM peak hour.