I-95/I-395 HOV/Bus/HOT Lanes Interchange Justification Report

Volume 1

January 7, 2009

PRESENTED TO:

Virginia Department of Transportation

&

Federal Highway Administration

PREPARED FOR:

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HNTB

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This document was prepared in a manner consistent with the Federal and State requirements and processes to be utilized in the development of an Interchange Justification Report as documented in the Virginia Department of Transportation Location and Design Division Instructional and Informational Memorandum LD-200.3

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ES - EXECUTIVE SUMMARY

Background

The Virginia Department of Transportation (VDOT) requests approval of a proposed interchange modification and access change to I-95/I-395 in Northern Virginia. The I-95/I-395 HOT Lanes Project (Project) proposes to significantly enhance the existing High Occupancy Vehicle (HOV) system and provide the inclusion of a High Occupancy Toll (HOT) component. Capacity of this proposed HOV/Bus/HOT system will be increased by providing an additional lane on the existing portions of the I-95/I-395 HOV lanes, and extending the lanes further south, approximately nine miles beyond its current terminus. In addition, the Project proposes to improve modal interrelationships by adding new entry/exit points between the General Purpose (GP) and HOV/Bus/HOT lanes at eleven (11) locations, allowing transit vehicles to use the HOV/Bus/HOT lanes toll free, providing three new transit access facilities, providing funding for $195 million of transit improvements along the corridor, and implementing Travel Demand Management (TDM) strategies that will improve the interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor. The proposed Project is one of many improvement programs to relieve congestion along the existing I-95/I-395 corridor and is not expected to relieve all the congestion issues along the corridor. However, the proposed Project will relieve congestion at key locations within the improvement limits.

For every proposed highway system modification affecting Interstate Highway access, the Federal Highway Administration (FHWA) requires the completion of an Interchange Justification Report (IJR) that contains sufficient information to facilitate their independent evaluation of the request and to ensure that all pertinent factors and alternatives have been appropriately considered. The FHWA is the final reviewing agency for all Interstate highway access modification requests.

This executive summary includes five sections to present the necessary elements to facilitate FHWA review. Section 1 presents summaries of the need elements for the proposed Project; Section 2 presents the purpose of the proposed Project and describes how the proposed Project is expected to meet the need elements; Section 3 presents summaries of the No-Build and Build Alternatives considered in this IJR; Section 4 presents the analysis results of the alternatives considered and demonstrates how the proposed Project meets the needs along the I-95/I-395 corridor; and Section 5 describes how the proposed Project meets the eight justification requirements specified by the FHWA.

Project Needs

The I-95/I-395 corridor needs include the following: i) transportation demand on I-95/I-395 GP lanes currently exceeds capacity, resulting in traffic congestion and travel delays, ii) transportation demand will continue to increase with rapid economic development along I-95 and I-395 corridors, and iii) different types of transportation modes interface with I-95/I-395 and there is a need to facilitate modal interrelationships.

- **Transportation demand on I-95/I-395 GP lanes currently exceeds capacity, resulting in traffic congestion and travel delays**

I-95/I-395 is an essential element of the local, regional and national transportation system. It serves as a major commuting route connecting Washington DC and other major activity centers with suburban northern Virginia and provides access to the Capital Beltway, which connects major activity centers all around Washington DC. In addition, I-95/I-395 serves as a major route for interstate travel on the eastern part of the United States by connecting Maine with Florida. According to the Metropolitan Washington Council of Governments (MWCOG) periodic traffic surveys, I-95/I-395 GP lanes currently experience marginal to severe traffic congestion in the northbound direction towards Washington DC in the morning, and then southbound in the evening. As is typical in such situations, travel delays are common.

TRANSPORTATION DEMAND ON I-95/I-395 GP LANES CURRENTLY EXCEEDS THE AVAILABLE CAPACITY.

Severe traffic conditions along a large number of segments of the existing I-95/I-395 corridor results in unacceptable travel delays to roadway users and is an indication that the roadway was not designed to accommodate the high volumes of traffic. Traffic congestion and travel delays will continue if no improvements are implemented along the I-95/I-395 corridor. In response to the current traffic congestion on the I-95/I-395 corridor, the National Capitol Region Constrained Long Range Plan (CLRP) and the Fredericksburg Area Metropolitan Planning Organization (FAMPO) CLRP prioritized the proposed Project to implement improvements along the I-95/I-395 corridor.

- **Transportation demand will continue to increase with rapid economic development along I-95 and I-395 corridors**

Traffic congestion along the I-95/I-395 corridor is expected to increase even more in the future, since transportation demand will increase as a result of rapid economic development that occurs along the corridor. Emerging employment and regional activity centers are designated for growth along the I-95 and I-395 corridors and will generate high levels of traffic in the future. According to the master and comprehensive plans for Alexandria and Stafford, Prince William, Fairfax, and Arlington counties, there are 10 regional activity centers that are designated for growth located in close proximity to the I-95/I-395 corridor. In addition, recent recommendations by the Defense BRAC include relocating over 84,000 jobs to five designated BRAC sites along the I-95/I-395 corridor that include the Pentagon, Fort Belvoir, Mark Center, Marine Corps Base Quantico, and the Engineer Proving Ground (EPG).

RAPID ECONOMIC DEVELOPMENT ALONG I-95/I-395 WILL RESULT IN INCREASED TRANSPORTATION DEMAND IN THE FUTURE.

- **Different types of transportation modes interface with I-95/I-395 and there is a need to facilitate modal interrelationships**

Currently different types of transportation modes, including HOV lanes, mass transit services, and ridesharing interface with the I-95/I-395 corridor and there is a need to improve the interrelationships between them. According to the I-95/I-395 Transit/TDM Study, completed by the Virginia Department of Rail and Public Transportation (DRPT) in February 2008, potential links to improve the interrelationships

between the different types of transportation modes along the corridor exists. A goal of the National Capital Region CLRP states that the metropolitan region will develop, implement and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy throughout the entire region. In addition, the FAMPO CLRP states that the transportation system will enhance the integration and connectivity of the transportation system, across and between modes.

THERE IS A NEED TO IMPROVE MODAL INTERRELATIONSHIPS ALONG I-95/I-395.

Project Purpose

Given these needs, the purpose of the proposed Project is to: i) expand and enhance the existing I-95/I-395 roadway system and to ii) facilitate modal interrelationships, to meet future transportation demand.

- **Expand and enhance the existing I-95/I-395 roadway system**

The proposed Project will expand and enhance the existing roadway system by:

- Adding a third lane to the existing HOV lanes on I-95/I-395 from South Eads Street near the Pentagon in Arlington County, to their existing southern terminus south of Dumfries Road in Prince William County (all three lanes will be converted to HOV/Bus/HOT lanes);
- Adding two new HOV/Bus/HOT lanes south of the existing HOV terminus to just south of Joplin Road;
- Extending a single HOV/Bus/HOT lane to a point just north of Garrisonville Road in Stafford County; and
- Dedicating the HOV/Bus/HOT lanes for use by qualifying HOV traffic (three or more vehicle occupants), which will continue to travel for free, and non-HOV traffic (which is currently allowed to use GP lanes only), which will be permitted to travel on the HOV/Bus/HOT lanes by paying a toll.

The proposed expansion and enhancement of the existing roadway system are expected to relieve congestion and reduce travel delays to meet future transportation demand on the GP lanes along the I-95/I-395 corridor and GP lanes segments experiencing severe congestion by diverting non-HOV traffic to the proposed HOT/Bus/HOV lanes by using a variable toll based on traffic demand. The variable toll will change in response to real-time traffic conditions to regulate demand and will keep the HOV/Bus/HOT lanes congestion-free per Federal SAFETEA-LU requirements.

THE PROPOSED PROJECT OFFERS INCREASED CAPACITY TO MEET FUTURE TRANSPORTATION DEMAND.

- **Facilitate modal interrelationships**

The proposed Project will facilitate modal interrelationships by:

- Adding new entry/exit points between the GP and HOV/Bus/HOT lanes at eleven (11) locations. These additions are shown in the Table on page ES-4 and associated **Figure ES-1**;
- Modifying four (4) existing entry/exit points that currently provide access to the HOV lanes, and upgrading one existing (1) ramp to a direct flyover ramp;

- Improving modal interrelationships by allowing transit vehicles to use the HOV/Bus/HOT lanes toll free by providing a reversible HOV/Bus/HOT lane ramp into and out of the Pentagon at Eads street, providing a bus only access ramp at Seminary Road in Alexandria, and providing a reversible bus-only ramp from the HOV/Bus/HOT lanes into and out of a new bus station located adjacent to the Lorton Virginia Railway Express (VRE) Station;
- Adding $195 million of transit improvements along the I-95/I-395 corridor that will include six park and ride facilities that are expected to provide an additional 3,000 parking spaces to the network of existing park and ride lots in the corridor. In addition the initial planned bus service improvements as a direct result of the $195 million of available funding, will add approximately 38,000 hours of bus service in 2010, approximately 98,000 hours of bus service in 2020, and approximately 98,000 hours of bus service in 2030, according to the National Capital Region Transportation Plan (the Financially Constrained Long Range Plan (CLRP) for the Washington metropolitan area). Compared to the bus services assumed for future years in the CLRP, the additional hours of bus service represents and increase from the 2006 base year of approximately 10% in 2010, 19% in 2020, and 18% in 2030. The transit improvements will be implemented at the discretion of the appropriate public agencies; and

  THE PROPOSED PROJECT WILL FACILITATE MODAL INTER-RELATIONSHIPS TO MEET FUTURE TRANSPORTATION DEMAND.
- Implementing TDM strategies that will improve the interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor.

Access Locations

Nr*	Access Ramp Location	Improvement
1	I-95; HOV/Bus/HOT lanes to SB GP lanes north of Garrisonville Road	New
2	I-95; HOV/Bus/HOT lanes to SB GP lanes south of Dumfries Road	Modified
3	I-95; HOV/Bus/HOT lanes to NB GP lanes over Powell Creek north of Dumfries Road	New
4	I-95; SB GP lanes to HOV/Bus/HOT lanes north of Dale Boulevard	New
5	I-95; HOV/Bus/HOT lanes to NB GP lanes north of Prince William Parkway	New
6	I-95; SB GP lanes to HOV/Bus/HOT lanes at US Highway 1	New
7	I-95; HOV/Bus/HOT lanes to/from Lorton Road in-line transfer station to Lorton Virginia Railway Express (VRE) Station (reversible ramp)	New
8	I-95; HOV/Bus/HOT lanes to NB GP lanes north of Lorton Road	New
9	I-95; HOV/Bus/HOT lanes to SB GP lanes south of Fairfax County Parkway	Removed
10	I-95; Fairfax County Parkway to HOV/Bus/HOT lanes (reversible ramp)	New
11	I-95; HOV/Bus/HOT to/from I-495 Capital Beltway and I-495 HOV/Bus/HOT lanes**	Modified
12	I-395; HOV/Bus/HOT lanes to NB GP lanes south of Duke Street (at Turkeycock Run)	New
13	I-395; HOV/Bus/HOT lanes to Seminary Road (south facing, buses only)	New
14	I-395; HOV/Bus/HOT lanes to Shirlington Rotary (south facing)	New
15	I-395; HOV/Bus/HOT lanes to SB GP lanes south of Eads Street	Modified
16	I-395; HOV/Bus/HOT lanes to Eads Street (reversible)	Modified

*Access location number. These numbers correspond with the location numbers in Figure ES-1 above.

**Operational change to ramps that are to be constructed as part of I-495 Capital Beltway HOV/Bus/HOT lanes.

Figure ES-1 – Access Locations

The proposed new, modified, and upgraded entry/exit points between the GP and HOV/Bus/HOT lanes will improve access and modal interrelationships and are expected to relieve congestion and reduce travel delays along the I-95/I-395 corridor by diverting non-HOV traffic on the GP lanes to HOV/Bus/HOT lanes. The new and modified entry/exit points will be located at strategic points along the I-95/I-395 corridor to ensure that HOV/Bus/HOT lane users will not need to travel through more than two interchanges to access the HOV/Bus/HOT lanes from the GP lanes or to access GP lanes from the HOV/Bus/HOT lanes.

The addition of new facilities that allow transit vehicles to use the HOV/Bus/HOT lanes toll free and the provision of new high quality public transportation opportunities will increase the efficiency and capacity of public transportation. The improved public transportation is expected to relieve congestion along the I-95/I-395 corridor by decreasing vehicular traffic on the GP and HOV/Bus/HOT lanes, since a significant number of vehicle users are expected to switch their mode of travel to high quality public transportation.

In addition, the implementation of TDM strategies is expected to further relieve congestion and reduce travel delays along the I-95/I-395 corridor, since these strategies will improve modal interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor.

Alternatives Considered

This IJR considered a No-Build and Build Alternative and will be referenced as follows:

Alternatives Considered

Alternative	General Features
No-Build	The No-Build Alternative provides no GP lane, HOV lane, or transit improvements to I-95/I-395 except for periodic maintenance and minor enhancements needed to maintain operations of the facilities, along with other planned improvements to the regional roadway and transit network described in the Constrained Long Range Transportation Plans CLRPs pertinent to the corridor.
Build	The Build Alternative includes the I-95/I-395 HOV/Bus/HOT lanes improvements, adding new entry/exit points between GP and HOV/Bus/HOT lanes, transit improvements, and various Travel Demand Management (TDM) strategies along with other planned improvements to the regional roadway and transit network described in the Constrained Long Range Transportation Plans (CLRPs) pertinent to the corridor.

Alternatives Analysis Results

An alternatives analysis was conducted to demonstrate how the expansion and enhancement of the existing I-95/I-395 roadway system and the improvement of modal interrelationships along the I-95/I-395 corridor will relieve congestion and meet future transportation demand to address the needs along the I-95/I-395 corridor. The alternative analysis included a comparison between the No-Build (baseline condition) and Build Alternatives. The alternatives analysis included the following:

- **System-Wide Benefits:** To demonstrate the impact that the proposed Project will have on the corridor operations, the system-wide benefits (Level of Service (LOS) and change in density/delay analysis) results on the GP lanes, HOV/Bus/HOT lanes, and cross street intersections along the I-95/I-395 corridor were

compared for the No-Build and Build Alternatives in 2015 (opening year) and 2030 (design year) for both the AM and PM peak hours.

- **Levels of Congestion:** To demonstrate how the proposed project will affect levels of congestion on GP lanes at representative locations (segments) along the corridor, the alternative analysis included a congestion level analysis (V/C ratios) for the No-Build and Build Alternatives in the design year (2030) for both the AM and PM peak hours.
- **Traffic Volume Analysis:** To demonstrate how the proposed project will affect traffic volumes at representative locations (segments) along the corridor, the alternative analysis included a traffic volume analysis for the No-Build and Build Alternatives in the design year (2030) for the AM and PM peak hours.

This section discusses the results of the system-wide benefits analysis, the congestion level analysis, and the traffic volume analysis. This section ends with the alternative analysis conclusions.

- **System-Wide Benefits**

Several different software tools were utilized for the traffic analysis. Determination of the proper tool was based on the capabilities of the various traffic analysis software tools. Highway Capacity Software (HCS) based on Highway Capacity Manual (HCM) methodologies, was utilized as the primary analysis tool for the GP, HOV/Bus/HOT lanes and cross street intersections. LOS, which ranges from LOS A (free flow) to LOS F (breakdown in flow), qualitatively describes the degree of congestion of a given segment of roadway based on density (basic freeway segments, weave, ramp junctions) or delay (intersections) and is a key indicator of roadway performance. However, a comparison of LOS alone may not be adequate, as density and delay are a continuum. Therefore, a small change in density or delay may change the LOS by one letter rating, while in reality the change is not substantial. Therefore, to compare the No-Build and Build Alternatives in the year 2015 and 2030, a comparison based on LOS and change in density/delay was developed.

The comparison of the No-Build and Build Alternatives was categorized by segment or intersection as positive, neutral, or negative. A positive rating indicated that the Build Alternative operated substantially better than the No-Build Alternative. A negative rating indicated the Build Alternative operated substantially worse than the No-Build Alternative, and a neutral rating indicated no substantial difference between the Build and No-Build Alternatives. According to VDOT, one of the proposed new or revised access requirements is that the proposed access points should not have a significant adverse impact on the operation of the Interstate facility. The segments or intersections categorized as negative in the system-wide benefit analysis will have an adverse impact on the operation of the facility. Therefore, for comparison purposes, the segments or intersections categorized as neutral and positive result would be in the same category, as opposed to a negative or adverse impact.

THE BUILD ALTERNATIVE PROVIDES OVERALL SYSTEMWIDE BENEFITS.

Figure ES-2 is a summary of all calculations for the year 2015 GP lanes, HOV/Bus/HOT lanes, and intersections analyzed within the project area for the 2015 AM and PM peak hours. For this opening year 95% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. This constitutes an overall operational improvement for the corridor when the Build Alternative is compared to the No-Build Alternative.

Figure ES-2 – Year 2015 System-wide Benefits

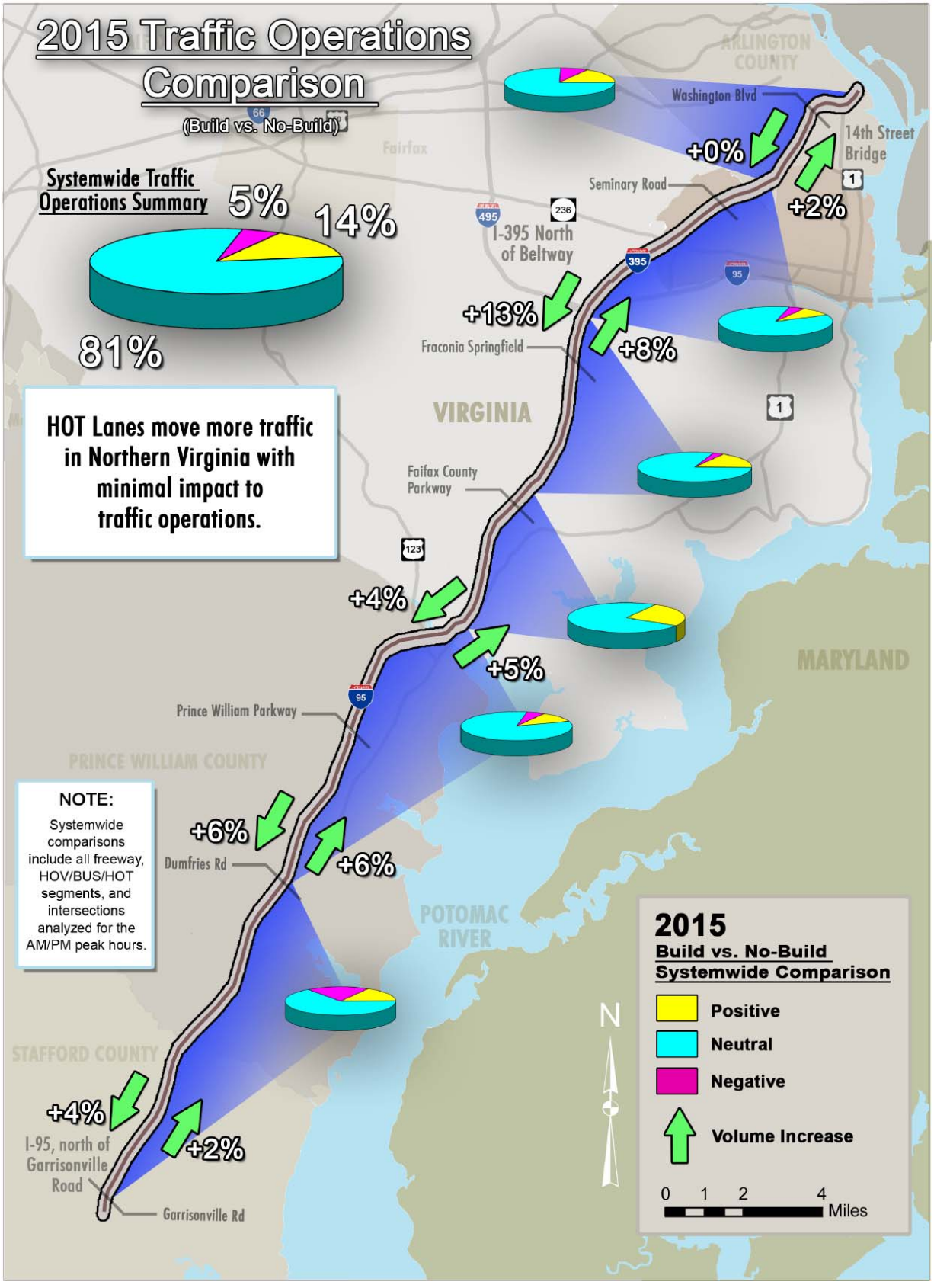


Figure ES-3 – Year 2030 System-wide Benefits

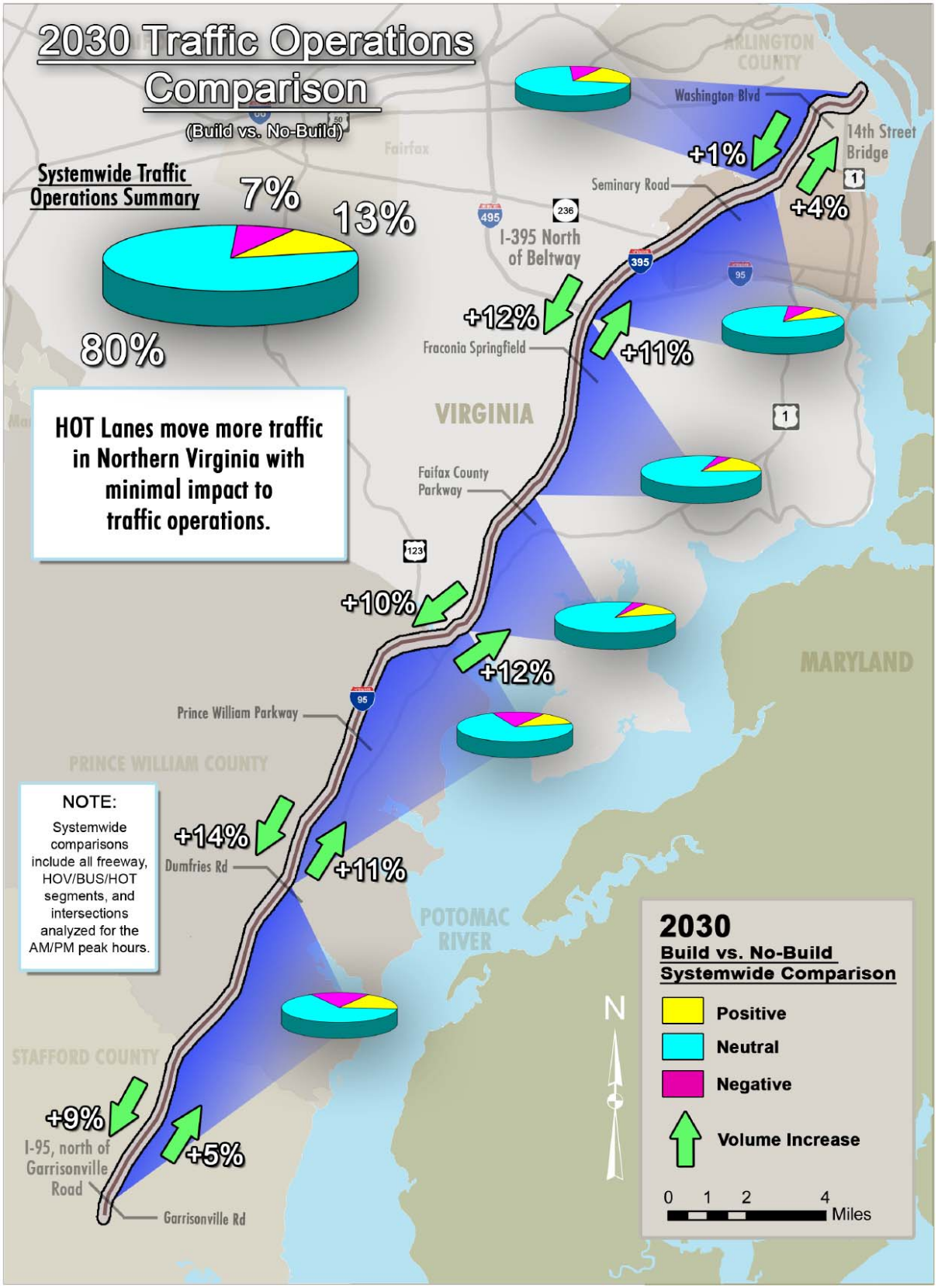


Figure ES-3 is a summary of all calculations for the year 2030 GP lanes, HOV/Bus/HOT lanes, and intersections analyzed within the project area for the 2030 AM and PM peak hours. For this design year 93% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. As with the 2015 analysis, this constitutes an overall operational improvement for the corridor when the Build Alternative is compared to the No-Build Alternative.

- **Level of Congestion**

To demonstrate how the proposed Project will effect congestion on GP lanes at representative locations (segments) along the I-95/I-395 corridor, the V/C ratio analysis included a comparison of V/C ratios at representative locations along the corridor for the Build and No-Build Alternatives. The analysis focused on five representative locations that are located at intermittent locations along the corridor and included locations that currently experience severe congestion according to the Metropolitan Washington Council of Governments (MWCOG).

The V/C ratio is a link-based measure that reflects the level of congestion of a facility or a section of a facility. V/C ratios ranges from less than 0.5 (low or no congestion) to greater than 1.0 (severe congestion), and is a quantitative measure of the level of congestion of a given segment of roadway based on the traffic volume and the capacity of the roadway. Figure ES-4 shows the 2015 and 2030 comparison of the volume and capacities on the GP and HOV/Bus/HOT lanes for the Build and No-Build Alternative in the AM and PM peak hour at five representative locations along the I-95/I-395 corridor. The table below shows a comparison of the 2030 (design year) V/C ratios on the GP lanes for the No-Build and Build Alternative in the AM and PM at the five representative locations along the I-95/I-395 corridor shown in Figure ES-4. According to the table below, an increase in V/C ratio, when comparing the No-Build and Build Alternative, indicates a negative impact on congestion (makes congestion worse), a decrease in V/C ratio indicates a positive impact on congestion (improve congestion), and no change in V/C ratio indicates a neutral impact on congestion (congestion stays the same).

2030 GP lanes V/C Ratio Comparison

Location	Time/Direction	Projected Peak Hour V/C Ratio - 2030 (No-Build/Build)	Congestion Effect (Build vs. No-Build)
I-95; North of Garrisonville Rd	AM Peak/Northbound	1.05/1.11	Negative
I-95; North of Garrisonville Rd	PM Peak/Southbound	0.91/0.77	Positive
I-95; North of Dumfries Rd	AM Peak/Northbound	0.79/0.76	Positive
I-95; North of Dumfries Rd	PM Peak/Southbound	0.80/0.72	Positive
I-95; North of Gordon Blvd.	AM Peak/Northbound	0.67/0.62	Positive
I-95; North of Gordon Blvd.	PM Peak/Southbound	0.59/0.49	Positive
I-395: North of I-495	AM Peak/Northbound	0.57/0.49	Positive
I-395: North of I-495	PM Peak/Southbound	0.71/0.70	Positive
I-395; at 14th Street	AM Peak/Northbound	0.89/0.89	Neutral
I-395; at 14th Street	PM Peak/Southbound	0.70/0.70	Neutral

When comparing the 2030 V/C Ratio results for the No-Build and Build Alternatives on GP lanes at representative locations along the I-95/I-395 corridor in the AM peak hour, the congestion gets worse (negative) at one location, improves (positive) at three locations, and stays the same (neutral) at one location. The one location that indicates a negative impact on congestion (I-95; North of Garrisonville Rd), is located at the southern terminus of the proposed Project. The proposed Project does not include any improvements at this location in the AM peak hour and proposed future improvements south of the propose Project are expected to alleviate these conditions. All three of the representative locations that show an improvement in congestion (positive) are located at locations of severe congestion according to the MWCOG periodic traffic surveys. In addition, one of these three representative locations (I-95; North of Dumfries Rd) was identified as one of the top 10 congested locations in the National Capital Region CLRP. The one representative location that indicates no impact on congestion (I-395; at 14th Street), is located at the northern terminus of the proposed Project. The proposed Project does not include any improvements at this location in the AM peak hour and future improvements north of the proposed Project are expected to alleviate these conditions.

THE PROJECT WILL IMPROVE CONGESTION AT REPRESENTATIVE LOCATIONS ALONG THE CORRIDOR.

When comparing the 2030 V/C Ratio results for the No-Build and Build Alternative on GP lanes at representative locations along the I-95/I-395 corridor in the PM peak hour, the congestion improves (positive) at four of the five locations and stays the same (neutral) at one of the locations. Three of the four locations that show an improvement in congestion are located at locations of severe congestion according to the Metropolitan Washington Council of Governments (MWCOG) periodic traffic surveys. The one representative location that indicates no impact on congestion (I-395; at 14th Street), is located at the northern terminus of the proposed project. The proposed Project does not include any improvements at this location in the PM peak hour and future improvements north of this project are expected to alleviate these conditions.

The volume and capacity comparison for the AM and PM peak hours (Figure ES-4) demonstrates how the proposed Project (Build Alternative) will relieve congestion on the GP lanes along the I-95/I-395 corridor and GP lanes experiencing severe congestion as a result of non-HOV traffic that is expected to divert to the proposed HOT/Bus/HOT lanes in response to the new capacity and improved access, the switch of vehicle users on the GP lanes to high quality public transportation, and the improved modal interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor.

A demonstration of non-HOV traffic on GP lanes diversion to the proposed HOT/Bus/HOT lanes as a result of the propose Project is shown in the bar charts in Figure ES-4. When comparing the volumes and capacities for the GP lanes and the HOV/Bus/HOT lanes for the No-Build and Build Alternatives for the AM and PM peak hour, the overall volumes and capacities for the HOT/Bus/HOT lanes increases, while there is an overall decrease in volumes and no change to the capacities for the GP lanes. The overall volumes on the HOV/Bus/HOT lanes increase as a result of non-HOV traffic that diverts from the GP lanes to the HOT/Bus/HOT lanes and overall capacities on the HOT/Bus/HOT lanes increases as a result of the additional and new lanes included in the proposed Project. The volumes on the GP lanes decrease as a result of non-HOV traffic that diverts to HOT/Bus/HOT lanes and there is no change in capacity, since the proposed Project does not include improvements to the GP lanes.

Figure ES-4 – 2015 Volume/Capacity Comparison

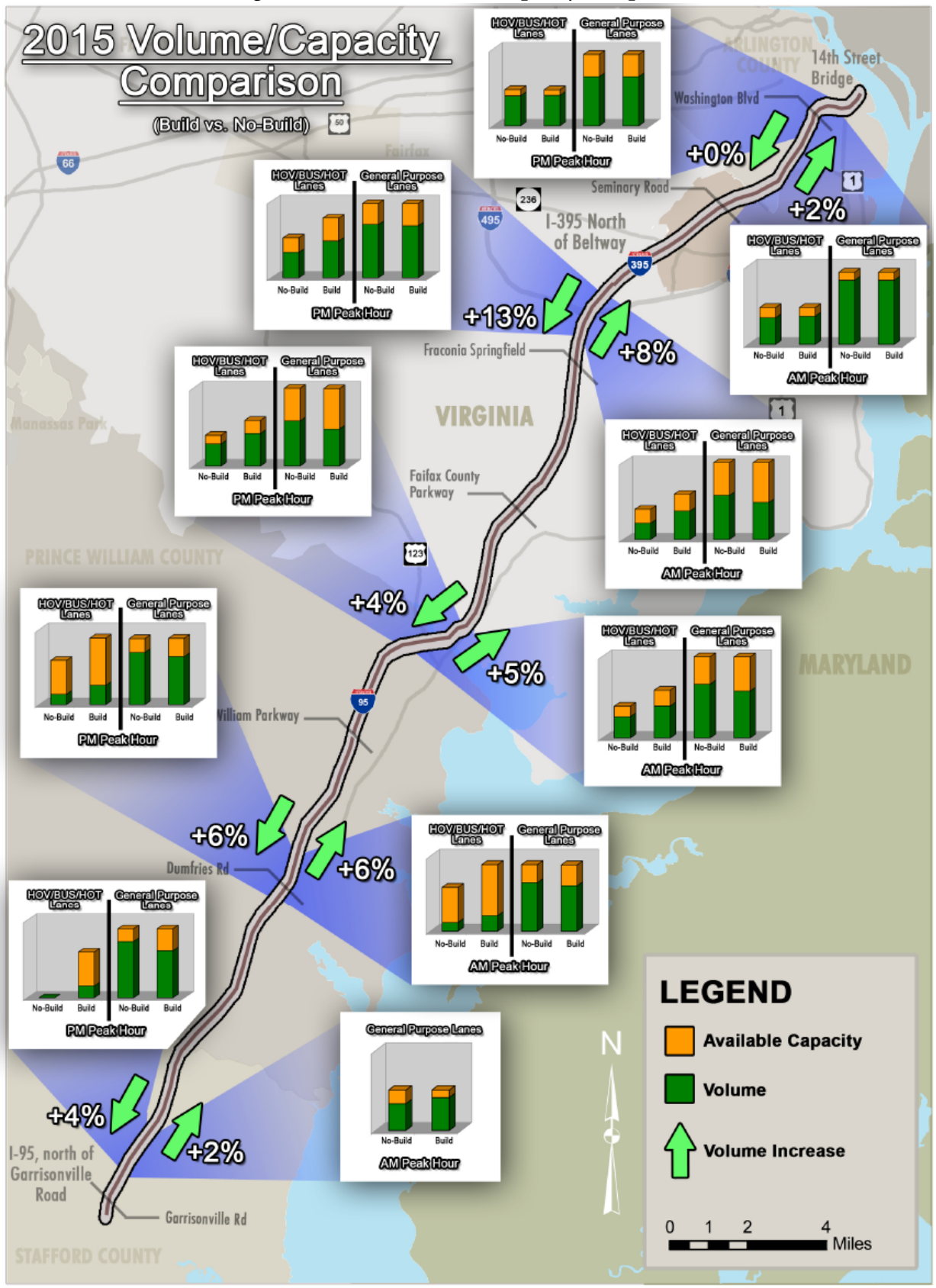
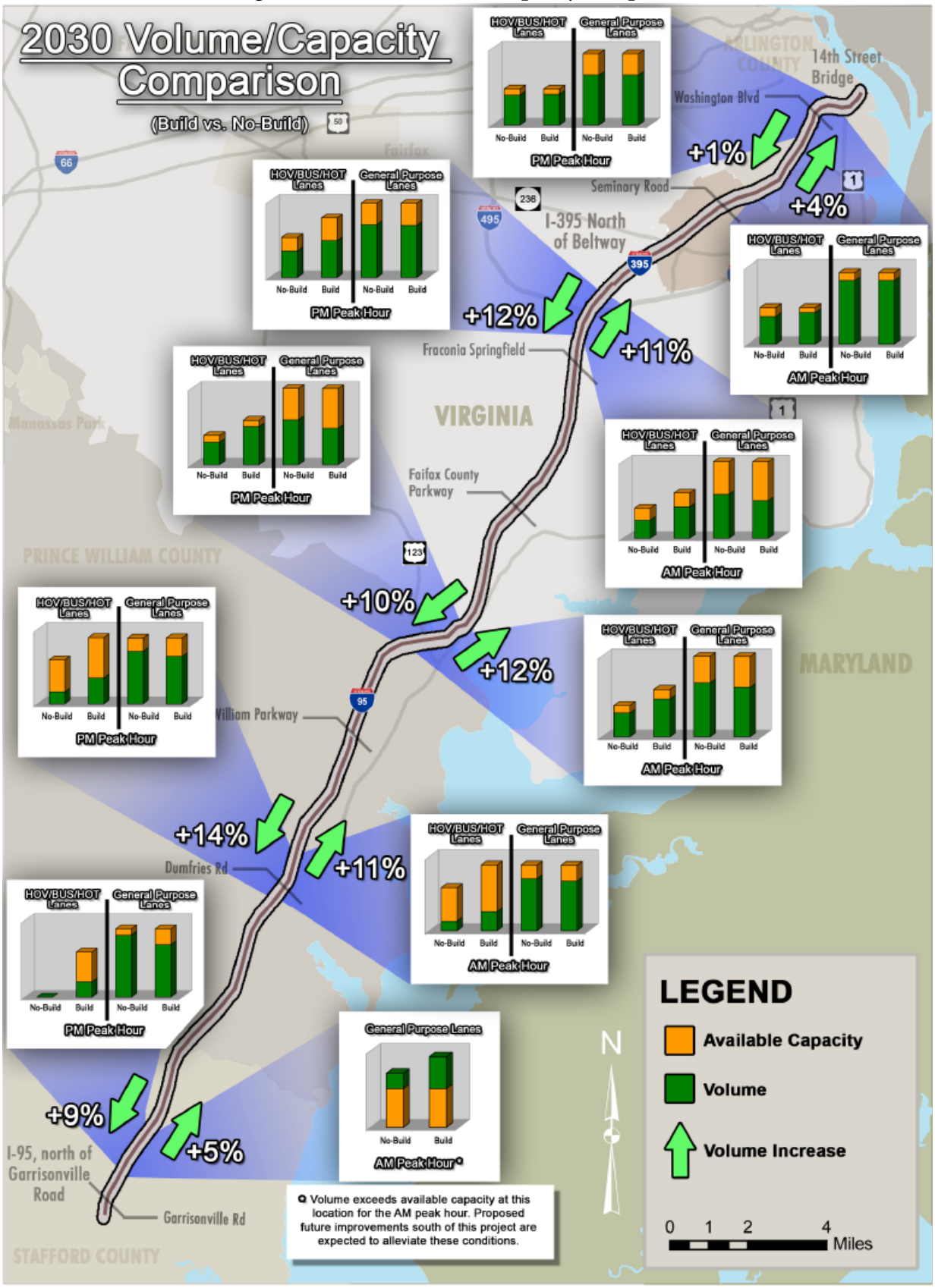


Figure ES-4 – 2030 Volume/Capacity Comparison



- **Traffic Volumes Analysis**

To demonstrate how the proposed Project will affect traffic volumes at locations (segments) along the corridor, the alternative analysis included a traffic volume analysis on the roadway segments at representative locations for the No-Build and Build Alternatives. Traffic volumes are forecast to increase along the corridor for the Build Alternative compared to No-Build Alternative in 2030 for the AM and PM peak hour, as indicated in the table below. The largest increases are anticipated in the central portion of the corridor with marginal increases at the northern and southern termini consistent with developing land use patterns in the region. This demonstration highlights the latent travel demand in the corridor for the Build Alternative above that in the No-Build Alternative. The system-wide improvements under Build Alternative will induce and accommodate this additional travel.

2030 Traffic Volume Comparison

Location	Time/Direction	Projected Peak Hour Volume - 2030 (No-Build/Build)	Projected Difference - 2030 (Build vs. No-Build)
I-95; North of Garrisonville Rd	AM Peak/Northbound	7,470/7,860	+5%
I-95; North of Garrisonville Rd	PM Peak/Southbound	6,450/7,040	+9%
I-95; North of Dumfries Rd	AM Peak/Northbound	6,660/7,420	+11%
I-95; North of Dumfries Rd	PM Peak/Southbound	6,910/7,850	+14%
I-95; North of Gordon Blvd.	AM Peak/Northbound	11,540/12,950	+12%
I-95; North of Gordon Blvd.	PM Peak/Southbound	10,740/11,830	+10%
I-395: North of I-495	AM Peak/Northbound	9,690/10,740	+11%
I-395: North of I-495	PM Peak/Southbound	9,330/10,480	+12%
I-395; at 14th Street	AM Peak/Northbound	11,760/12,250	+4%
I-395; at 14th Street	PM Peak/Southbound	10,400/10,500	+1%

Figures ES-3 and ES-4 graphically depicts the relationship of the projected 2030 traffic volumes to the system-wide benefits and volumes to capacities comparisons at five representative locations along the corridor for the AM and PM peak hour. This demonstrates that increased volumes along the corridor are readily accommodated by the proposed Project (Build Alternative) while improving overall system-wide benefits and volume to capacity levels at representative locations as would be experienced without the Project (No-Build Alternative).

- **Conclusions**

When comparing the No-Build and Build Alternative, the Build Alternative will relieve congestion and meet future transportation demand by:

- Providing an overall operational improvement for the I-95/I-395 corridor. For the opening year (2015), 95% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative and for the design year (2030), 93% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative.

- Improving congestion on GP lanes at representative locations along the I-95/I-395 corridor and locations experiencing severe congestion in the design year (2030). The proposed Project improved congestion on GP lanes and at all representative locations along the improvement limits of the Project and locations of severe congestion according to the MWCOG periodic traffic surveys and the National Capital Region CLRP when comparing the V/C ratios for the Build with the No-Build Alternative in the AM and PM peak hour.

- Accommodating increased volumes in the design year (2030) while improving overall operational performance along the corridor and improving levels of congestion at representative locations and locations experiencing severe congestion along the corridor. The volume increases demonstrates the latent travel demand in the corridor for the Build Alternative above that in the No-Build Alternative.

The alternative analysis results demonstrate how the expansion and enhancement of the existing I-95/I-395 roadway system and the improvement of modal interrelationships along the I-95/I-395 corridor will relieve congestion along the corridor to address the current and future needs of the I-95/I-395 corridor.

THE PROJECT PROVIDES OPERATIONAL IMPROVEMENTS, WILL IMPROVE CONGESTION ON GP LANES AT REPRESENTATIVE LOCATIONS, AND WILL ACCOMMODATE INCREASED VOLUMES DURING PEAK PERIODS.

FHWA Justification Requirements

The FHWA has specified eight justification requirements (criteria), which should be met by all proposals for new or revised access points to the existing Interstate System. This report addresses each of the eight criteria for the proposed Interstate access change along I-95/I-395 in Northern Virginia. A summary of the eight criteria appears below.

<u>Criteria 1</u> – *It needs to be demonstrated that existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time provide the access intended by the proposed I-95/I-395 Project.*

The existing interchange and the access points to the I-95/I-395 HOV lanes were evaluated using year 2015 and year 2030 traffic demands in the No-Build Alternative. The results of the year 2015 and year 2030 analysis show that the existing access points cannot provide the necessary access to meet the traffic demands.

Under the 2015 No-Build Alternative 45 out of the 622 freeway segments are expected to operate at LOS E or F during either the AM or PM peak hour. In the same year, 37 out of 141 intersections are expected to operate at LOS E or F during either the AM or PM peak hour.

Under the 2030 No-Build Alternative 71 out of the 622 freeway segments are expected to operate at LOS E or F during either the AM or PM peak hour. In the same year 41 out of the 141 intersections are expected to operate at LOS E or F during either the AM or PM peak hour.

In addition, the proposed I-95/I-395 Project includes the addition of a third lane to existing HOV lanes which will be converted to HOV/Bus/HOT lanes, along with the construction of new HOV/Bus/HOT lanes,

therefore four (4) of the existing access points need to be modified and eleven (11) new access points are needed to provide access to the significantly altered and expanded facility.

Criteria 2 – All reasonable alternatives for design option, location and transportation system management type improvements such as ramp metering, mass transit and HOV facilities have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

The Build Alternative includes HOV/Bus/HOT lane improvements, the addition of new entry/exit points between the GP and HOV/Bus/HOT lanes, allowing transit vehicles to use the HOV/Bus/HOT lanes toll free, providing three new transit access facilities, and providing $195 million of transit improvements along the corridor. In addition, Travel Demand Management (TDM) improvements were included to correct and enhance future operational problem areas on I-95/I-395. Examples of TSM/TDM improvements include additional and modified traffic signals, additional turn lanes at intersections, and the addition of auxiliary lanes to improve operations at specific locations.

Criteria 3 – The proposed access points should not have a significant adverse impact on the safety and operation of the interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urban areas, include an analysis of sections of interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchanges with new or revised access points.

According to the freeway, HOV/Bus/HOT, and intersection Level of Service (LOS) analysis completed for this IJR, the proposed Build Alternative will provide notable system-wide benefits when compared to the No-Build Alternative for both year 2015 and year 2030. For the opening year of 2015, 95% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. Additionally, for the design year of 2030, 93% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. This constitutes an overall operational improvement for the corridor when the Build Alternative is compared to the No-Build Alternative. The results of the operational studies show the Build Alternative provides overall system-wide benefits, provides HOV enhancements, provides significant transit improvement opportunities, and employs pricing techniques to optimize operations and capacity. This allows the Build Alternative to successfully conform to the needs of the project, without any significant degradation to the existing GP lanes on I-95/I-395 or the current HOV system.

Criteria 4 – The proposed access connects to public roads only and will provide for all traffic movements. Less than "full interchanges" for special purpose access for transit vehicles, for HOV's, or into park and ride lots may be considered on a case by case basis. The proposed access will be designed to meet or exceed current standards for Federal aid projects on the Interstate System.

The proposed Project connects to public facilities only and includes eleven (11) new entry/exit points between the GP and HOV/Bus/HOT lanes on an Interstate roadway and the modification of four (4) existing entry/exit points that provides access to the existing HOV/Bus/HOT lanes and therefore provides for all traffic movements to and from Interstate highways.

The design of the proposed I-95/I-395 HOV/Bus/HOT lanes, connecting freeways, and adjacent service interchanges is intended to meet or exceed American Association of State Highway and Transportation Officials (AASHTO) design standards, where feasible. However, it is acknowledged that there will be exceptions to standards to better meet the needs of the Project and to minimize impacts. These exceptions to standards will be documented in the Exceptions to Standards Report to be submitted for review by VDOT and FHWA.

Criteria 5 – The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

The proposed improvements to I-95/I-395 are consistent with local and regional land use plans including, the Stafford, Prince William, Fairfax, and Arlington County's Comprehensive Plans, as well as the City of Alexandria's Master Plan. The improvements are also consistent with the Constrained Long Range Transportation Plans (CLRPs) pertaining to the study area, including those from the Fredericksburg Area Metropolitan Planning Organization (FAMPO) (the CLRP for the Fredericksburg area) and the National Capital Region Transportation Plan (the CLRP for the Washington metropolitan area).

Criteria 6 – In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within the context of a long term plan.

The improvements to I-95/I-395 in the Stafford County portion of the I-95/I-395 study limits are included in the FAMPO 2030 CLRP, the fiscally constrained plan for the Fredericksburg area. Improvements to I-95/I-395 located in the City of Alexandria, Prince William County, Fairfax County, and Arlington County are included in the National Capital Region CLRP, the fiscally constrained plan for the Washington metropolitan region.

The CLRP's for the National Capital Region and FAMPO comprehensively look at the transportation needs throughout the region, including the I-95/I-395 corridor. The traffic analysis completed for this IJR considered all of the elements in these plans that affect the project corridor. All new and revised access points are supported by these comprehensive network study recommendations.

Criteria 7 – The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

The new or modified access points included in the proposed Project are needed to provide access to the expanded and enhanced HOV lanes, which are converted to HOV/Bus/HOT lanes; and the additional/extended HOV/Bus/HOT lanes. They are not proposed as a result of new or expanded development. The proposed access points will not be used to provide access between any new or expanded development and the GP lanes.

Criteria 8 – The request of new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.

A Categorical Exclusion (CE) is currently being prepared by VDOT in compliance with the National Environmental Policy Act (NEPA) and was submitted to FHWA for approval in November 2008.

Conclusions

- The Build Alternative (Project) meets the need and purpose of the I-95/I-395 corridor by expanding and enhancing the existing I-95/I-395 roadway system and facilitating modal interrelationships to meet future transportation demand.
- The Build Alternative does conform to the eight justification requirements specified by the FHWA.

THE PROJECT CONFORMS TO THE EIGHT JUSTIFICATION REQUIREMENTS SPECIFIED BY THE FHWA.

I. PROJECT BACKGROUND

A. PROJECT DESCRIPTION

ADDITIONAL HOV/BUS/HOT LANES WILL BE CONSTRUCTED.

I-95/I-395 serves as a major commuting route connecting Washington DC and other major activity centers with suburban northern Virginia and provides access to the Capital Beltway, which connects major activity centers all around Washington DC (See **Figure III-1**). In addition, I-95/I-395 serves as a major route for interstate travel on the eastern part of the United States by connecting Maine with Florida. The project proposes to add a third lane to the existing 28-miles of HOV lanes on I-95/I-395 from South Eads Street near the Pentagon in Arlington County, to their existing southern terminus Route 234 (Dumfries Road) near Dumfries in Prince William County and to convert these lanes to HOV/Bus/HOT lanes. This will be accomplished by restriping and/or reconstructing and overlaying existing pavement. The HOV/Bus/HOT lanes will operate alongside the existing GP lanes and will be reserved for buses, vanpooling, carpooling, motorcycles, emergency vehicles and motorists who choose to pay a toll.

EXISTING HOV LANES WILL BE CONVERTED TO HOV/BUS/HOT LANES.

South of the existing HOV terminus at Route 234 (Dumfries Road), two new HOV/Bus/HOT lanes will be constructed to just south of Quantico Creek and a flyover ramp will be constructed for HOV/Bus/HOT traffic to exit at the Route 619 (Joplin Road) interchange. From there, a single lane will be extended to a point just north of Aquia Creek in Stafford County (approximately 1.5 miles north of the Route 610 Garrisonville exit) where HOV/Bus/HOT traffic could merge with the GP traffic. The additional distance between the existing HOV terminus and the end of the new construction is approximately 8 miles. Under the tolling plan proposed by Fluor-Transurban, the HOV/Bus/HOT lanes will be dedicated for use by qualifying HOV traffic (three or more vehicle occupants), which will continue to travel for free, and non-HOV traffic, which will be permitted to travel on the facility by paying a toll. The tolls will vary depending on the level of use of the facility, with higher prices during periods of higher volumes and lower prices during periods of lower volumes. In addition to the new lanes, eleven (11) new entry/exit points between the GP and HOV/Bus/HOT lanes will be provided using direct, flyover, or slip ramps. Twenty-two (22) of the existing HOV ramps will be used to provide access to the proposed HOV/Bus/HOT lanes, four (4) of the existing HOV ramps will be modified to provide access to the proposed HOV/Bus/HOT lanes, and one (1) of the existing HOV ramps will be removed. The proposed HOV/Bus/HOT lanes will have 37 entry/exit points.

ELEVEN (11) NEW ENTRY/EXIT POINTS BETWEEN THE GENERAL PURPOSE AND HOV/BUS/HOT LANES WILL BE PROVIDED.

In addition the Project proposes to improve modal interrelationships by allowing transit vehicles to use the HOV/Bus/HOT lanes toll free, providing three new transit access facilities, providing $195 million of transit improvements along the corridor, and implementing TDM (Travel Demand Management) strategies that will improve the interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor.

Traffic in the I-95/I-395 corridor has increased significantly over the past few decades. As a result of the major increase in traffic seen on I-95/I-395, VDOT began a series of progressive projects to accommodate HOV starting in 1969. The following provides a timeline of HOV projects along I-95/I-395:

HOV Project Timeline

Year	HOV Project Description
1969	Special lanes on I-395 were reserved for temporary express buses
1975	Opening of permanent bus lanes on I-95/I-395 from 14th Street to Franconia-Springfield Parkway
1975 - 1979	Converting reserved bus only lane to HOV (four or more vehicle occupants)
1980	Converting reserved bus only lane to HOV (three or more vehicle occupants)
1985 - 1992	HOV lanes extension to I-95/Dumfries Road interchange

This IJR focuses on the proposed modifications to I-95/I-395 from Aquia Creek in Stafford County (approximately 1.5 miles north of Route 610 Garrisonville Road) north to South Eads Street in Arlington County, a distance of approximately 36 miles. The proposed Project is one of many improvement programs to relieve congestion along the existing I-95/I-395 corridor and is not expected to relieve all the congestion issues along the corridor. However, the proposed Project will increase corridor capacity and facilitate modal interrelationships to meet future transportation demand.

37 ENTRY/EXIT POINTS BETWEEN THE GP AND HOV/BUS/HOT LANES WILL BE PROVIDED.

To provide access to/from the HOV/Bus/HOT lanes (both GP lane traffic and HOV/Bus/HOT lane traffic), the future project roadway network, which is illustrated in **Figure I-2** will provide the following connections for HOV/Bus/HOT lane traffic:

HOV/Bus/HOT Lanes Access Points

Access Ramp Location	Proposed Project	AM Peak	PM Peak
I-95; HOV/Bus/HOT lanes to SB GP lanes north of Garrisonville Road	Construct New Ramp		✓
I-95; HOV/Bus/HOT lanes to SB GP lanes south of Dumfries Road	Modify Existing Ramp		✓
I-95; GP lanes to HOV/Bus/HOT lanes south of Dumfries Road	Use Existing Ramp	✓	
I-95; HOV/Bus/HOT lanes to NB GP lanes over Powells Creek north of Dumfries Road	Construct New Ramp	✓	
I-95; HOV/Bus/HOT lanes to SB GP lanes near Cardinal Drive north of Dumfries Road	Use Existing Ramp		✓
I-95; NB GP lanes to HOV/Bus/HOT lanes near Cardinal Drive north of Dumfries Road	Use Existing Ramp	✓	
I-95; SB GP lanes to HOV/Bus/HOT lanes north of Dale Blvd	Construct New Ramp		✓
I-95; HOV/Bus/HOT lanes to SB CD lanes at Potomac Mills, north of Opitz Blvd*	Use Existing Ramp	✓	✓
I-95; NB CD lanes to HOV/Bus/HOT lanes at Potomac Mills, north of Opitz Blvd*	Use Existing Ramp	✓	✓
I-95; Prince William Parkway to HOV/Bus/HOT lanes*	Use Existing Ramp	✓	✓
I-95; HOV/Bus/HOT lanes to NB GP lanes north of Prince William Parkway	Construct New Ramp	✓	
I-95; Gordon Boulevard (Route 123) to HOV/Bus/HOT lanes*	Use Existing Ramp	✓	✓
I-95; SB GP lanes to HOV/Bus/HOT lanes at US Highway 1	Construct New Ramp		✓
I-95; US Highway 1 to HOV/Bus/HOT lanes*	Use Existing Ramp	✓	✓
I-95; HOV/Bus/HOT lanes to NB GP lanes at north of Lorton Road	Construct New Ramp	✓	
I-95; HOV/Bus/HOT lanes to/from proposed Lorton Road in-line transfer station to Lorton VRE station*	Construct New Ramp	✓	✓
I-95; NB GP lanes to HOV/Bus/HOT lanes south of Fairfax County Parkway	Use Existing Ramp	✓	
I-95; HOV/Bus/HOT lanes to SB GP lanes at south of Fairfax County Parkway	Remove Ramp		✓
I-95; Fairfax County Parkway to HOV/Bus/HOT lanes*	Construct New Ramp	✓	✓
I-95; HOV/Bus/HOT lanes to NB GP lanes north of Fairfax County Parkway	Use Existing Ramp	✓	
I-95; SB GP lanes to HOV/Bus/HOT lanes south of Franconia-Springfield Parkway	Use Existing Ramp		✓
I-95; HOV/Bus/HOT lanes to Franconia-Springfield Parkway (south facing)*	Use Existing Ramp	✓	✓
I-95; Franconia-Springfield Parkway to HOV/Bus/HOT lanes (north facing)*	Use Existing Ramp	✓	✓
I-95; HOV/Bus/HOT lanes to SB GP lanes south of Franconia Road	Use Existing Ramp		✓
I-95; NB GP lanes to HOV/Bus/HOT lanes south of Franconia Road	Use Existing Ramp	✓	
I-95; Franconia Road to HOV/Bus/HOT lanes (north facing)*	Use Existing Ramp	✓	✓
I-95; HOV/Bus/HOT to/from I-495 Capital Beltway and I-495 Hov/Bus/HOT lanes**	Modify Existing Ramp	✓	✓
I-395; HOV/Bus/HOT lanes to NB GP lanes south of Duke Street (at Turkeycock Run)	Construct New Ramp	✓	
I-395; SB GP lanes to HOV/Bus/HOT lanes south of Duke Street (at Turkeycock Run)	Use Existing Ramp		✓
I-395; HOV/Bus/HOT lanes to SB GP lanes south of Duke Street (at Turkeycock Run)	Use Existing Ramp		✓
I-395; NB GP lanes to HOV/Bus/HOT lanes south of Duke Street (Turkeycock Run)	Use Existing Ramp	✓	
I-395; HOV/Bus/HOT lanes to Seminary Road (south facing, buses only)*	Construct New Ramp	✓	✓
I-395; Seminary Road to HOV/Bus/HOT lanes (north facing)*	Use Existing Ramp	✓	✓
I-395; HOV/Bus/HOT lanes to Shirlington Rotary (south facing)*	Construct New Ramp	✓	✓
I-395; Shirlington Rotary to HOV/Bus/HOT lanes (north facing)*	Use Existing Ramp	✓	✓
I-395; HOV/Bus/HOT lanes to Washington Blvd*	Use Existing Ramp	✓	✓
I-395; HOV/Bus/HOT lanes to Eads Street*	Modify Existing Ramp	✓	✓
I-395; HOV/Bus/HOT Lanes to SB GP lanes south of Eads Street	Modify Existing Ramp	✓	✓

*Reversible Ramp

** Operational change to ramps that are to be constructed as part of I-495 Capital Beltway HOV/Bus/HOT lanes

In addition, the project will modify the following GP ramp; I-95; Fairfax County Parkway to SB GP (access from Fairfax County Parkway maintained, access from Alban Road/Backlick Road removed).

Transit opportunities will be enhanced by the proposed HOV/Bus/HOT project by increasing bus service along the I-95/I-395 corridor, expansion of the HOV capacity, and increasing the access points between the HOV/Bus/HOT lanes and the GP lanes. New transit opportunities will be created by the project including a reversible HOV/Bus/HOT ramp into and out of the Pentagon at Eads Street, a bus only access ramp at Seminary Road in Alexandria, and a reversible bus-only ramp from the HOV/Bus/HOT lanes into and out of a new bus station located adjacent to the Lorton VRE Station. The initial planned improvements in the corridor will add approximately 38,000 hours of bus service in 2010, approximately 98,000 hours of bus service in 2020, and approximately 98,000 hours of bus service in 2030, according to the National Capital Region Transportation Plan (the Financially Constrained Long Range Plan (CLRP) for the Washington metropolitan area). Compared to the bus services assumed for future years in the CLRP, the additional hours of bus service represents and increase from the 2006 base year of approximately 10% in 2010, 19% in 2020, and 18% in 2030.

THE PROPOSED BUS SERVICE IMPROVEMENTS IN THE CORRIDOR WILL ADD APPROXIMATELY 98,000 HOURS OF BUS SERVICE IN 2030.

In addition, as part of the proposed project, $195 million will be contributed to transit improvements along the corridor to be implemented by others. Based on recommendations in a Virginia Department of Rail and Public Transportation (DRPT) study, this will be accomplished by providing modifications to existing routes, new bus service on routes, and improvement and expansion of transit centers, stations and parking facilities. This is anticipated to include six park and ride facilities, including one in Fairfax County, two in Prince William County, two in Stafford County, and one in Spotsylvania County. These facilities are expected to provide an additional 3,000 parking spaces to the network of existing park and ride lots in the corridor.

$195 MILLION WILL BE CONTRIBUTED TO TRANSIT IMPROVEMENTS ALONG THE CORRIDOR TO BE IMPLEMENTED BY OTHERS.

The enhanced transit usage as a result of the proposed project is expected to improve trip times along the I-95/I-395 corridor, improve predictability of transit schedules, and provide more flexibility. In addition, the proposed project manages traffic congestion through supply and demand by the use of dynamic pricing strategies in accordance with SAFETEA-LU for all vehicles on the HOV/Bus/HOT lanes throughout the day. The conversion of the HOV lanes to the improved HOV/Bus/HOT lanes will allow the facility to be used by qualifying HOV traffic and non-HOV traffic, which could pay a toll to use the facility. The toll will be variable depending on the demand and congestion levels of the facility. During peak periods, when space on the facility is at a premium, tolls will be set at higher levels. During less congested periods, tolls will be less. The HOV/Bus/HOT lanes will remain free for transit vehicles and vehicles with a minimum of three occupants.

ENHANCED TRANSIT AND DYNAMIC PRICING OF HOV/BUS/HOT LANES WILL IMPROVE TRIP TIMES.

B. COMPREHENSIVE INTERSTATE NETWORK

The improvements to I-95/I-395 in the Stafford County portion of the I-95/I-395 study limits are included in the FAMPO 2030 Constrained Long-Range Transportation Plan, the CLRP for the Fredericksburg area. Improvements to I-95/I-395 located in City of Alexandria, Prince William, Fairfax, and Arlington Counties are included in the fiscally constrained National Capital Region Transportation Plan, the CLRP for the Washington metropolitan region over the next 25 years.

The CLRPs for the National Capital Region and FAMPO comprehensively look at the transportation needs throughout the Capital Region, including the I-95/I-395 corridor. The traffic analysis completed for this IJR considered all of the elements in these plans that affect the study corridor. No additional access points beyond those included in this study are known.

TRAFFIC ANALYSIS CONSIDERED ELEMENTS OF RELEVANT CLRP'S COVERING THE I-95/I-395 STUDY LIMITS.

C. RELATIONSHIP TO OTHER HIGHWAY IMPROVEMENT PLANS

No significant systemwide capacity or safety enhancements have been completed along the I-95/I-395 corridor under study, since the extension of the HOV lanes to Dumfries Road in the early 1990's. The I-95/I-395 HOV/Bus/HOT lanes project currently overlaps with a number of other projects or proposed improvement programs. The study area connects with or overlaps with the following project study areas as listed and described below:

NO SIGNIFICANT SYSTEM-WIDE ENHANCEMENTS HAVE BEEN COMPLETED SINCE THE EARLY 1990S.

- 14th Street Bridge (I-395 and US-1)
- I-495 Capital Beltway HOV/Bus/HOT Lanes
- I-95/I-395/I-495 Springfield Interchange
- Woodrow Wilson Bridge Improvement Project
- Franconia-Springfield Parkway ramps to I-95
- Fairfax County Parkway extension
- Fairfax County Parkway Engineer Proving Ground (EPG) access roadways
- I-95 Widening
- Russell Road Improvements
- I-95/I-395 HOV/Bus/HOT Lanes (Southern Portion)

14th Street Bridge

The Environmental Impact Statement (EIS) for the 14th Street Bridge Project began in July 2006. The EIS is a three-year study that will address the current and future needs of metropolitan Washington DC. With increasing commuters, travelers, public transit users, pedestrians, and bicyclists; the safety and mobility of this link has become a priority. Various alternatives are currently under consideration and are being evaluated during the EIS process.

I-495 Capital Beltway HOV/Bus/HOT Lanes

The I-495 Capital Beltway HOV/Bus/HOT lanes project, currently under construction, will improve capacity and safety along the western portion of the Capital Beltway. The I-495 Capital Beltway HOV/Bus/HOT lanes project, which is located in Fairfax County, Virginia, includes the construction of two new HOV/Bus/HOT

lanes in each direction from the I-95/I-395/I-495 (Springfield) interchange to just north of the Dulles Toll Road.

I-95/I-395/I-495 Interchange Project

Completed in 1997, the I-95/I-395/I-495 (Springfield) IJR focused on improvements to relieve bottlenecks at the Springfield Interchange that will reduce congestion and enhance traffic operations and safety along the interstate. These improvements included the physical separation of through and local traffic on I-95, reconfiguration of interchange ramps for improved service, elimination of objectionable merging and weaving movements on the interstate mainline, and provisions for complete HOV facilities and connections between Shirley Highway (I-95/I-395) and the Capital Beltway (I-495).

Construction of improvements to the Springfield Interchange began in early 1999. Construction of the first seven phases of the Springfield Interchange Improvement Project was recently completed. The improvements included major modifications to the existing interchange that significantly increased the capacity and safety of one of the most traveled interchanges in Northern Virginia. The last phase of the interchange will provide direct connections between the HOV lanes on the Beltway (I-495) and HOV Lanes on I-95/I-395 and is currently being constructed as part of the I-495 Capital Beltway HOV/Bus/HOT lanes project. The connections will provide a seamless network for HOV vehicles traveling on I-95/I-395 and on the Beltway (I-495) between Springfield and Tysons Corner. With the implementation of the I-95/I-395 HOV/Bus/HOT lanes project, the connections can provide a seamless network for HOV/Bus/HOT vehicles as well. A separate IMR is currently being developed to study the operational impacts of allowing both HOV and HOV/Bus/HOT traffic to use these connections (See **Appendix E**).

A SEPARATE IMR HAS BEEN PREPARED FOR TOLLED ACCESS TO THE I-95/I-395/I-495 INTERCHANGE HOV RAMPS

Woodrow Wilson Bridge Improvement Project

The Woodrow Wilson Bridge project, currently under construction, will substantially improve capacity and safety along the southern portion of the Beltway (I-495). The Woodrow Wilson Bridge Project, which is located in Northern Virginia and Prince George's County, Maryland, includes capacity enhancements to the mainline and interchanges between Virginia Route 241 (Telegraph Road) and Maryland Route 210 (Indian Head Highway). The centerpiece of the project is the replacement of the existing six-lane Woodrow Wilson Bridge with two bridges that can ultimately provide 12 lanes of traffic over the Potomac River. The final configuration provides for barrier-separated express lanes that could eventually be incorporated into a larger Beltway (I-495) HOV/Bus/HOT Lane network, if additional improvements were constructed between the interchanges of Virginia Route 401 (Van Dorn Street) and Route 241 (Telegraph Road).

Franconia-Springfield Parkway Ramps to I-95

The Franconia-Springfield Parkway Ramps to I-95 project, currently under consideration, will substantially improve accessibility, convenience, and safety to the area transportation network in addition to relieving traffic congestion on Old Keene Mill Road. The Franconia-Springfield Parkway Ramps to I-95 project includes connections from southbound I-95 to eastbound Franconia-Springfield Parkway and from westbound Franconia Springfield Parkway to northbound I-95. The proposed ramp connections will be used by motorists heading to Tysons Corner, Washington DC, and the Woodrow Wilson Bridge from Franconia Springfield Parkway and Old Keene Mill Road.

Fairfax County Parkway Extension

The Fairfax County Parkway project, currently under construction, will extend the Parkway between Rolling Road and Fullerton Road through the Engineering Proving Grounds (EPG). The approved Fairfax County Parkway improvements include:

- four through lanes with right of way to expand to six lanes in the future (access from Fullerton Road to the Parkway will be eliminated);
- a partial cloverleaf interchange with the future EPG access road;
- access improvements at Franconia-Springfield Parkway, Hoes Road, and Rolling Road;
- and the extension of Boudinot Drive to the Fairfax County Parkway including a grade-separated loop ramp.

The project will be built in four phases with the first phase to be completed in late 2010.

Fairfax County Parkway EPG Access Roadways

The Fairfax County Parkway EPG Access Roadways project, currently under consideration, will determine what improvements are needed along I-95 and other key roadways in preparation for the traffic influx expected at the EPG in Fairfax County, Virginia as a result of the recommendations made by the Defense Base Realignment and Closure Commission (BRAC). The primary purpose for providing the additional access points from I-95 to the EPG is to improve accessibility and convenience and to relieve traffic congestion in the area transportation network surrounding the development site. Various access alternatives are currently under consideration.

I-95 Widening

The I-95 Widening project, currently under construction, will improve capacity and safety along I-95 between Fairfax County Parkway and Gordon Boulevard (Route 123). The I-95 Widening project, which is located in Fairfax County, Virginia, includes the construction of a fourth lane in each direction on I-95 between the Fairfax County Parkway and Route 123. The additional lane will relieve bottlenecks and congestion in this area, and provide improved traffic flow to and from the recently completed I-95/I-395/I-495 (Springfield) interchange. The $123 million, six-mile widening will be completed in 2011.

Russell Road Improvements

The Marine Corp Base Quantico (MCBQ), Virginia is expected to receive new development as a result of recommendations made by BRAC; this will include the construction of new facilities west of I-95. The primary access point for the new development will be the I-95/Russell Road interchange. The Russell Road interchange will be improved to maintain a reasonable LOS when the new facilities will be constructed.

I-95/I-395 HOV/Bus/HOT Lanes (Southern Portion)

An Environmental Assessment has been initiated to explore improvements south of the proposed I-95/I-395 HOV/Bus/HOT lane project. According to the National Capital Region CLRP, the project will include the addition of one lane from Dumfries Road to Garrisonville Road; the southern terminus of the HOV/Bus/HOT lane project proposed in this IJR. According to the FAMPO CLRP, the project will include the addition of two (2) HOV/Bus/HOT lanes to I-95 from the Prince William County line to the Spotsylvania Interchange (I-95 interchange #126) and the project will be completed in 2015. It should be noted that the northern portion of the project limits for this project overlaps with the study area of the I-95/I-395 HOV/Bus/HOT lane project proposed in this IJR.

D. COMMUNITIES OR ACTIVITIES DIRECTLY SERVED

I-95/I-395 serves as a major commuting route connecting Washington DC and other major activity centers with suburban northern Virginia (See **Figure I-3**). The I-95/I-395/I-495 (Springfield) interchange in the northern portion of the I-95/I395 corridor provides connections to the Capital Beltway, which connects major activity centers all around Washington DC. In addition, I-95/I-395 serves as a major route for interstate travel on the eastern part of the United States by connecting Maine with Florida.

Local communities directly adjacent to the corridor that are expected to be served by the proposed improvements to I-95/I-395 include:

Communities Served by the Proposed Project

Community	County	Population (2000)
Aquia Harbour	Stafford	7,856
Quantico Station	Prince William	6,571
Triangle	Prince William	5,500
Dumfries	Prince William	4,937
Montclair	Prince William	15,782
Dale City	Prince William	55,971
Woodbridge	Prince William	31,941
Lorton	Fairfax	17,786
Newington	Fairfax	19,784
Franconia	Fairfax	31,907
Springfield	Fairfax	30,417
Lincolnia	Fairfax	15,788
Alexandria	Alexandria	128,238
Arlington	Arlington	189,453

Source: US Census Bureau, 2000.

II. NEED AND PURPOSE

The I-95/I-395 corridor needs include the following:

- Transportation demand on I-95/I-395 GP lanes currently exceeds capacity, resulting in traffic congestion and travel delays.
- Transportation demand will continue to increase with rapid economic development along I-95 and I-395 corridors.
- Different types of transportation modes interface with I-95/I-395 and there is a need to facilitate modal interrelationships.

TRANSPORTATION DEMAND ON I-95/I-395 CURRENTLY EXCEEDS THE AVAILABLE CAPACITY.

I-95/I-395 is an essential element of the local, regional and national transportation system. It serves as a major commuting route connecting Washington DC and other major activity centers with suburban northern Virginia and provides access to the Capital Beltway, which connects major activity centers all around Washington DC. In addition, I-95/I-395 serves as a major route for interstate travel on the eastern part of the United States by connecting Maine with Florida. According to the MWCOG periodic traffic surveys, I-95/I-395 GP lanes currently experience marginal to severe traffic congestion in the northbound direction towards Washington DC in the morning, and then southbound in the evening. As is typical in such situations, travel delays are common.

Traffic congestion along the I-95/I-395 corridor is expected to increase even more in the future, since transportation demand will increase as a result of rapid economic development that occurs along the corridor. Emerging employment and regional activity centers are designated for growth along the I-95 and I-395 corridors and will generate high levels of traffic in the future. According to the master and comprehensive plans for Alexandria and Stafford, Prince William, Fairfax, and Arlington counties, there are 10 regional activity centers that are designated for growth located in close proximity to the I-95/I-395 corridor. In addition, recent recommendations by the Defense BRAC include relocating over 84,000 jobs to five designated BRAC sites along the I-95/I-395 corridor that include the Pentagon, Fort Belvoir, Mark Center, Marine Corps Base Quantico, and the Engineer Proving Ground (EPG). In response to the current traffic congestion and future transportation demand on the I-95/I-395 corridor, the National Capitol Region CLRP and the FAMPO CLRP prioritized improvements to the I-95/I-395 corridor.

RAPID ECONOMIC DEVELOPMENT ALONG I-95/I-395 WILL RESULT IN INCREASED TRANSPORTATION DEMAND IN THE FUTURE

Currently different types of transportation modes, including HOV lanes, mass transit services, and ridesharing are interface with the I-95/I-395 corridor and there is a need to improve the interrelationships between them. According to the I-95/I-395 Transit/TDM study conducted by the Virginia Department of Rail and Public Transportation (DRPT), potential links to improve the interrelationships between the different types of transportation modes along the corridor exists. The National Capital Region CLRP states that the metropolitan region will develop, implement and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy throughout the entire region. In addition, the FAMPO CLRP states that the transportation system will enhance the integration and connectivity of the transportation system, across and between modes.

THERE IS A NEED TO IMPROVE MODAL INTERRELATIONSHIPS ALONG I-95/I-395

Given these needs, the purpose of the proposed project is to expand and enhance the existing I-95/I-395 roadway system and facilitate modal interrelationships to meet future transportation demand.

The proposed I-95/I-395 HOV/Bus/HOT lanes system offers increased capacity, new access points, and improved modal interrelationships that will relieve congestion on the I-95/I-395 general purpose lanes to meet existing and future transportation demand. The HOV/Bus/HOT lanes will be dedicated for use by qualifying HOV traffic (three or more vehicle occupants), which will continue to travel for free, and non-HOV traffic (which is currently allowed to use general purpose lanes only), which will be permitted to travel on the HOV/Bus/HOT lanes by paying a toll. The proposed HOV/Bus/HOT lanes will relieve congestion on the GP lanes by diverting non-HOV traffic to the HOV/Bus/HOT lanes by using a variable toll based on traffic demand. The variable toll will change in response to real-time traffic conditions to regulate demand and will keep the HOV/Bus/HOT lanes congestion-free per Federal SAFETEA-LU requirements.

THE PROPOSED PROJECT OFFERS INCREASED CAPACITY AND WILL FACILITATE MODAL INTERRELATIONSHIPS TO MEET FUTURE TRANSPORTATION DEMAND.

The addition of a third lane to the existing HOV lanes (all these lanes will be converted to HOV/Bus/HOT lanes) on I-95/I-395 from their existing northern terminus at South Eads Street in Arlington County to their existing southern terminus just south of Route 234 at Dumfries will increase their capacity by 50%. The proposed project will also increase the capacity south of the existing southern terminus, by adding two new HOV/Bus/HOT lanes to just south of Quantico Creek and extend a single lane further south to Aquia Creek in Stafford County.

In addition, the proposed Project will facilitate modal interrelationships that will result in enhanced mobility for all users. Modal interrelationships will be improved between GP and HOV/Bus/HOT lanes by providing 11 new entry/exit points, and between HOV/Bus/HOT lanes and transit vehicles by allowing transit vehicles to use the lanes toll-free, by providing a reversible HOV/Bus/HOT lane ramp into and out of the Pentagon at Eads Street, providing a bus only access ramp at Seminary Road in Alexandria, and providing a reversible bus-only ramp from the HOV/Bus/HOT lanes into and out of a new bus station located adjacent to the Lorton VRE Station.

The proposed project will further improve modal interrelationships by including $195 million of transit improvements in the corridor that will include six park and ride facilities to be added, including one in Fairfax County, two in Prince William County, two in Stafford County, and one in Spotsylvania County. These facilities are expected to provide an additional 3,000 parking spaces to the network of existing park and ride lots in the corridor. In addition, the initial planned bus service improvements as a direct result of the $195 million of available funding, will add approximately 38,000 hours of bus service in 2010, approximately 98,000 hours of bus service in 2020, and approximately 98,000 hours of bus service in 2030, according to the National Capital Region Transportation Plan (the Financially Constrained Long Range Plan (CLRP) for the Washington metropolitan area). Compared to the bus services assumed for future years in the CLRP, the additional hours of bus service represents and increase from the 2006 base year of approximately 10% in 2010, 19% in 2020, and 18% in 2030. The transit improvements will be implemented at the discretion of the appropriate public agencies. The project will also include TDM strategies that will improve the interrelationships between GP lanes, HOV/Bus/Hot lanes, mass transit and ridesharing along the I95/I-395 corridor.

III. STUDY AREA

The study limits for this IJR are from Garrisonville Road (Route 610) in Stafford County north to Boundary Channel Drive in Arlington County, a distance of approximately 36 miles, as shown in **Figure III-2**. The IJR study area is based on the need to understand the operational and safety effects of the proposed build project on the HOV/Bus/HOT lanes, GP lanes, and interchanging crossroads. All interchanging crossroads in the corridor were studied, with a more detailed analysis at locations where the build project proposes to add or reconfigure access to the interstate system.

THE PROJECT STUDIED AN AREA FROM GARRISONVILLE ROAD IN STAFFORD COUNTY, NORTH TO BOUNDARY CHANNEL DRIVE IN ARLINGTON COUNTY.

The southern IJR study limit is the north facing ramps at the Garrisonville Road interchange, which corresponds to the southern terminus of the proposed project. Typically, FHWA and VDOT request that one interchange upstream and downstream of the project termini be included in the IJR study limits. However, the study area was terminated at Garrisonville Road due to the minimal work proposed at Garrisonville Road and because the adjacent interchange (Courthouse Road) is more than three miles to the south. No operational impacts are anticipated at the Courthouse Road interchange as a result of the proposed project.

The northern IJR study limit is Boundary Channel Drive, two interchanges beyond the northern terminus of the proposed project at Eads Street. This northern extension of the IJR study limit beyond the first adjacent interchange allows for broader consideration of system operations due to the closely spaced interchanges in this portion of the corridor.

The table below summarizes the interchanging crossroads included in the study area and the intersections along these crossroads that have been analyzed.

Intersections Analyzed

Crossroad Interchange Cross Street Intersections to be Considered
Garrisonville Rd
Garrisonville Rd, Salisbury Dr, and Stafford Market Pl
Garrisonville Rd and I-95 SB Off-Ramp
Jefferson Davis Hwy and I-95 NB Off-Ramp
Jefferson Davis Hwy I-95 NB On-Ramp
Garrisonville Rd, Jefferson Davis Hwy, and Washington Dr
Russell Rd
Russell Rd and I-95 SB On-Ramp/Off-Ramp
Russell Rd and I-95 NB Off-Ramp
Russell Rd and I-95 NB On-Ramp
Joplin Rd
Joplin Rd and Park Entrance Rd
Joplin Rd and I-95 SB On-Ramp
Joplin Rd and I-95 NB On-Ramp/Off-Ramp

Crossroad Interchange Cross Street Intersections to be Considered
Joplin Rd, Jefferson Davis Hwy, and Fuller Rd
Dumfries Rd
Dumfries Rd, Van Buren Rd, and Old Stage Rd
Dumfries Rd and I-95 SB On-Ramp
Dumfries Rd, Village Pkwy, and I-95 NB On-Ramp
Dumfries Rd, Old Stage Coach Rd, J. Davis Hwy, and N Fraley Blvd
Dale Blvd
Dale Blvd and Gideon Dr
Dale Blvd and Neabsco Mill Rd
Opitz Blvd
Optiz Blvd and Telegraph Rd
Potomac Mills Rd and I-95 SB Off-Ramp
Potomac Mills Rd and Telegraph Rd
Opitz Blvd and Potomac Hospital
Prince William Parkway
Prince William Pkwy, I-95 SB On-Ramp and Horner Rd Park & Ride Lot
Prince William Pkwy, York Dr, and Summerland Dr
Gordon Blvd
Gordon Blvd and Old Bridge Rd
Gordon Blvd and Devils Reach Rd
Gordon Blvd and I-95 HOV/Bus/HOT On-Ramp/Off-Ramp
Gordon Blvd, Monroe Dr, and Annapolis Way
Gordon Blvd and Horner Rd
Lorton Rd
Lorton Rd, Silverbrook Rd, and Sanger St
Lorton Rd and I-95 SB On-Ramp/Off-Ramp
Lorton Rd, I-95 NB On-Ramp/Off-Ramp, and Gunston Cove Rd
Lorton Rd and Lorton Market Sq
Fairfax County Pkwy
Backlick Rd and Fullerton Rd
Fairfax County Pkwy and Fullerton Rd (existing conditions only)
Boudinot Dr and Fullerton Rd
Alban Rd, Boudinot Dr, and I-95 SB On-Ramp (I-95 HOV/Bus/HOT Reversible ramp in build conditions)
Fairfax County Pkwy, I-95 NB Off-Ramp, and Newington Rd
Fairfax County Pkwy and Terminal Rd
Franconia-Springfield Pkwy
Franconia-Springfield Pkwy and I-95 HOV/Bus/HOT On-Ramp/Off-Ramp
Franconia Rd

Crossroad Interchange Cross Street Intersections to be Considered
Franconia Rd and Backlick Rd
Franconia Rd and Commerce St/Loisdale Rd
I-95 NB Off-Ramp, Loisdale Rd, and Spring Mall Dr
Edsall Rd
Edsall Rd and Cherokee Ave
Edsall Rd, Bren Mar Dr, and I-395 NB On-Ramp
Edsall Rd and Beryl Rd
Duke St
Duke St and Beauregard St
Duke St and S Walker St
Seminary Rd
Seminary Rd and Mark Center Dr
EB Seminary Rd and I-395 SB On-Ramp/Off-Ramp
EB Seminary Rd and I-395 NB Off-Ramp/On-Ramp
WB Seminary Rd and I-395 NB On-Ramp/Off-Ramp
WB Seminary Rd and I-395 SB Off-Ramp/On-Ramp
Seminary Rd and Kenmore Ave
King St
King St and Park Center Dr
King St and Menokin Dr
Shirlington Rotary
S Shirlington Rd, S Arlington Mill Dr, and I-395 SB Off-Ramp
Shirlington Rotary and Campbell Ave
S Quincy St and Campbell Ave
Shirlington Rotary and Gunston Rd
Martha Custis Dr and Gunston Rd
Quaker Ln, Preston Rd, and 32nd Rd
S Glebe Rd
S Glebe Rd and 24th Rd
S Glebe Rd and I-395 SB Off-Ramp
S Glebe Rd and I-395 NB Off-Ramp and 26th Rd
S Glebe Rd, S Four Mile Run Dr, and W Glebe Rd
Eads St
Eads St and N Rotary Rd
Eads St and S Rotary Rd
Eads St and I-395 SB On-Ramp/I-395 SB Off-Ramp
Eads St and I-395 NB Off-Ramp/I-395 NB On-Ramp
Eads St and Army Navy Dr

The IJR study area does not include the I-95/I-395/I-495 (Springfield) Interchange connections (See **Figure III-2**). The proposed I-95/I-395 HOV/Bus/HOT lanes project connections to the Beltway HOV/Bus/HOT lanes will be examined in a separate IMR; included in **Appendix E**.

IV. ALTERNATIVES CONSIDERED

A detailed alternatives analysis has not been conducted for this project, nor is one required for projects meeting the criteria for Categorical Exclusions (CE) under regulations implementing the NEPA. A CE document is currently being developed for the build project. Two alternatives are considered in this IJR, a No-Build Alternative, and a Build Alternative.

THE IJR CONSIDERED A BUILD AND NO-BUILD ALTERNATIVE.

A. NO-BUILD ALTERNATIVE

The No-Build Alternative provides no GP or HOV lane improvements to I-95/I-395 except for periodic maintenance and minor enhancements needed to maintain operations of the facilities, along with other planned improvements to the regional roadway and transit network described in the Constrained Long Range Transportation Plans CLRPs pertinent to the corridor. The planned improvements described in the CLRP include the following:

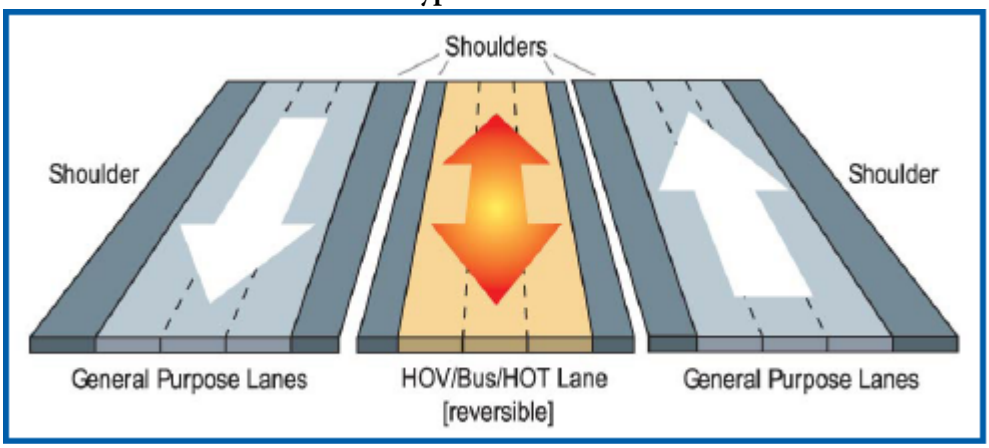
- I-95/I-395/I-495 Springfield Interchange
- I-495 Capital Beltway HOV/Bus/HOT Lanes
- Woodrow Wilson Bridge Improvement Project
- Franconia-Springfield Parkway ramps to I-95
- Fairfax County Parkway extension
- Fairfax County Parkway Engineer Proving Ground (EPG) access roadways
- I-95 Widening
- 14th Street Bridge (I-395 and US-1)

These planned improvements are assumed for both the 2015 and 2030 No-Build conditions traffic analysis that was conducted for this IJR.

B. BUILD ALTERNATIVE

The Build Alternative proposes the addition of a third lane to the existing HOV lanes on I-95/I-395 from South Eads Street near the Pentagon in Arlington County, to their existing southern terminus south of Dumfries Road in Prince William County. The addition of a third lane to the existing HOV lanes will be accomplished by restriping and/or reconstructing and overlaying existing pavement. As shown in the figure below, the three lanes in the middle will be reversible and will operate as HOV/Bus/HOT lanes and the existing outer lanes on either side will continue to carry GP traffic.

Typical Section



Source: VDOT, 2008.

The Build Alternative also includes the addition of two new HOV/Bus/HOT lanes south of the existing HOV terminus to just south of Quantico Creek, and from there extend a single lane to a point just north of Aquia Creek in Stafford County. In addition to the new lanes, eleven (11) new entry/exit points between the GP and HOV/Bus/HOT lanes will be provided using direct, flyover, or slip ramps. Twenty-two (22) of the existing HOV ramps will be used to provide access to the proposed HOV/Bus/HOT lanes, four (4) of the existing HOV ramps will be modified to provide access to the proposed HOV/Bus/HOT lanes, and one (1) of the existing HOV ramps will be removed. The proposed HOV/Bus/HOT lanes will have 37 entry/exit points. The Build Alternative will also include new public transportation options in the corridor and travel demand management strategies.

The tolling plan for the Build Alternative includes conversion of the existing restricted reversible HOV operation to a restricted reversible HOV/Bus/HOT operation. Under this conversion, the HOV/Bus/HOT lanes will be dedicated for use by qualifying HOV traffic (three or more vehicle occupants), which will continue to travel for free, and non-HOV traffic, which will be permitted to travel on the facility by paying a toll. The toll will be variable, depending upon the time of day and congestion levels of the facility. During peak periods, when space on the road is at a premium, tolls will be set at higher levels. During less congested periods, tolls will be less. In this way, traffic volumes on the lanes can be limited to volumes that permit satisfactory LOS throughout the day. The lanes will remain toll-free for transit vehicles and high occupancy vehicles.

THE BUILD ALTERNATIVE WILL CONTRIBUTE $195 MILLION TO TRANSIT IMPROVEMENTS.

As part of the Build Alternative, $195 million will be contributed to transit improvements along the corridor to be implemented by others. Completed in February 2008, the I-95/I-395 Transit/TDM Study conducted by the Virginia Department of Rail and Public Transportation (DRPT) provided recommendations on how to use these funds. The Fiscally Constrained Transit/TDM recommendation included service modifications to existing routes, new bus service on nine routes, and improvement and expansion of transit centers, stations, and parking facilities. The Transit/TDM improvement alternatives from the DRPT study are anticipated to cost approximately $300 million. In addition to the $195 million from the HOV/Bus/HOT lane sponsor, the study anticipated funding from Federal (US DOT) discretionary sources and from farebox recovery. The study also recommended the following TDM strategies which could be included:

- Financial incentives for HOV modes:
  - Incentives for vanpools (capital cost, insurance, driver incentives, and start-up and empty seat subsidies); and
  - Incentives for carpools.
- TDM information and assistance services:
  - Park-and-ride and TDM information signage;
  - TDM/HOV marketing; and
  - Rideshare program support (e.g., additional staff for rideshare information assistance).
- Other rideshare support:
  - Guaranteed Ride Home service; and
  - Slug/casual carpool staging areas
- Telework incentives for employers; and
- Electronic/tracking system support:
  - HOV/Bus/HOT lane transponders for vanpools; and
  - Carpool/vanpool mileage tracking.

THE BUILD ALTERNATIVE INCLUDES VARIOUS TDM AND TSM STRATEGIES.

In addition to the TDM strategies, TSM strategies that are designed to improve traffic operations and maximize the efficiency of the roadway network, such as additional and modified traffic signals, additional turn lanes at intersections, and the addition of auxiliary lanes to improve operations at specific locations will be implemented as part of the proposed project.

The 2015 and 2030 Build Alternatives analyzed in this IJR assumes that in addition to the proposed improvements, the existing I-95/I-395 mainline, its corresponding interchanges, and its surrounding roadway network remains in place, with little or no refinement except for such repairs and maintenance work as required to maintain the existing transportation network with the exception of the following improvements:

- I-95/I-395/I-495 Springfield Interchange
- I-495 Capital Beltway HOV/Bus/HOT Lanes
- Woodrow Wilson Bridge Improvement Project
- Franconia-Springfield Parkway ramps to I-95
- Fairfax County Parkway extension
- Fairfax County Parkway Engineer Proving Ground (EPG) access roadways
- I-95 Widening
- 14th Street Bridge (I-395 and US-1)

THE BUILD ALTERNATIVE WILL MODIFY AND IMPROVE EXISTING HOV LANES FOR MAXIMUM EFFICIENCY.

V. ROADWAY GEOMETRY

A. NUMBER OF MAINLINE AND CROSSROAD LANES

Figures V-1 thru **V-3** illustrates the number of lanes on both the mainline and crossroads throughout the project corridor for the Existing Condition, No-Build, and Build Alternatives.

B. DESIGN EXCEPTIONS FOR SUBSTANDARD FEATURES

The numbers listed below and shown on **Figure V-4** correspond to the Design Exceptions as submitted to VDOT for review and approval.

PROJECT DESIGN EXCEPTIONS AND WAIVERS FOR SUBSTANDARD FEATURES WERE SUBMITTED TO VDOT FOR APPROVAL.

DE 1: Reduced HOT Lanes and Shoulder Widths.
design exception request is for the reduction of travel lanes and shoulder widths. The proposed lane widths are 11'-12'-11' (looking north) from Prince William Parkway Sta. 819+00 to south of the Shirlington Rotary Sta. 1735+00. The west shoulder varies from 2.5 feet to 12 feet and the east shoulder varies from 10 feet to 12 feet.

The proposed lane widths from the Shirlington Rotary to the northern project terminus are 11 feet wide. The west shoulder varies from 2 feet to 9 feet and the east shoulder varies from 2 feet to 16 feet.

DE 2: Reduced HOT Lanes and Shoulder Widths on HOT Bridge.
The design exception request is for the reduction of travel lanes and shoulder widths on the existing HOV bridges to be less than AASHTO requirements.

DE 3: Reduced Northbound GP Shoulder at Shirlington Rotary.
The design exception request is for the shoulder width of the northbound I-395 GP shoulders to less than minimum standards to minimize the impact on the existing tree buffer of the historical residential area of Fairlington.

DE 4: HOT Lanes Bridge Vertical Clearance.
The design exception request is for the existing HOV/Bus/HOT bridge clearance to be less than AASHTO minimum standards at Occoquan Road, Furnace Road and Sanger Avenue.

DE 5: Substandard Superelevation Rate on HOT Lanes Curve/Bridge.
The design exception request is for the superelevation rates on horizontal curves which traverses across an existing bridge that has less than AASHTO requirements in accordance to the corresponding design speed at each location.

DE 6: Reduced Shoulder Width due to Bridge Piers.
The design exception request is for the shoulders on the HOV/Bus/HOT lanes at existing bridge piers to be reduced from the approach shoulder widths.

DE 7: Reduced Horizontal Sight Distance on HOT Lanes.
The design exception request is for reduced horizontal sight distance at four (4) locations along the HOV/Bus/HOT Lanes that have less than required stopping sight distance in accordance to the corresponding design speed at each location.

DE 8: Reduced HOT Ramp Shoulder Width.
The proposed ramp section consists of either one lane at 16 feet or two lanes totaling 24 feet wide with 2 feet wide shoulder on each side. The standard shoulder widths are 4 feet left and 6 feet right can not be obtained due to the limited space between the proposed HOT Lanes and the NB/SB GP Lanes. The 2 feet wide shoulder and lateral clearance to barrier is the minimum recommendation by AASHTO Guide for High Occupancy Vehicle Facilities, dated November 2004.

DE 9: Reduced HOV/Bus/HOT Shoulder Width due to Lighting, Traffic Management System (TMS) and Toll Structures.
The design exception request is for the shoulder of the HOV/Bus/HOT Lanes or either the NB/SB GP shoulders at proposed lighting, traffic management system (TMS) or toll structure location(s) to be reduced from the approach shoulder widths.

DE 10: Reduced NB/SB GP Shoulders.
The design exception request is for both the NB/SB GP shoulder widths. The existing NB/SB GP shoulders vary from 1 foot to 10 feet width depending the location along the corridor. As part of the proposed HOV/Bus/HOT project, double-face concrete barrier will replace the existing raised concrete curb and guardrail separating the HOT and GP roadways. On both the east and west side of the HOT Lanes the proposed gutter line of the concrete barrier will match exactly with the existing curb line, not infringing or narrowing the existing GP shoulders.

C. DESIGN WAIVERS FOR SUBSTANDARD FEATURES

DW 1: Posted Speed is Equal to Design Speed.
The design waiver request is for the posted speed to be equal to the design speed for the entire corridor between Garrisonville Road to Eads Street. Typically highway design engineering practice sets a posted speed 5 mph lower than a design speed. For this project, it is anticipated that the operating speed of HOT Lanes will more closely match the posted speed than a typical freeway because of the presence of Toll Enforcement posted throughout the corridor.

DW 2: Bridge Vertical Clearance at Intersecting Roadways under HOV Lanes at Ramp C and Joyce Street Bridges.
The AASHTO vertical clearance criteria for a new Urban Arterial structure is 16'-0" and VDOT vertical clearance criteria is 16'-6". The existing bridge vertical clearance at Ramp C is 16'-5" and the existing bridge over Washington Street and Joyce Street vertical clearance is 16-3 ½" which meets the AASHTO requirement but does not meet the VDOT requirement.

DW 3: Vertical Clearance less than VDOT Requirements.
AASHTO requires a minimum vertical clearance of 16'-0"; but VDOT Standards states the minimum vertical clearance is 16'-6". This design waiver request for the existing vertical clearances that are more than 16 feet but less than 16-6" remain at three (3) locations.

DW 4: Reduced Exit Ramp Recovery Area.
AASHTO Policy on Design Standards requires a full width shoulder and physical nose at the recovery area of exit ramp terminals. The design waiver request is for exit ramps that either have insufficient recovery areas

or substandard shoulder widths at the physical nose of the ramp. A full width shoulder and throat widening can not be accomplished since the roads/ramp are parallel to mainline in order to save right of way.

DW 5: HOT Lanes Compound Curves with Radii Ratio more than 1.5:1.
AASHTO Policy on Design Standards states that the recommended ratio of the flatter radius to sharper radius on compound curves should not exceed a ratio of 1.5:1. Existing I-95/I-395 was not constructed in accordance with this criterion; hence in most of the corridor the compound curves are simply match or parallel to the existing alignment. However, all horizontal curve radii meet or exceed the design speed requirements.

DW 6: Ramp Compound Curves with Radii Ratio more than 2:1.
AASHTO Policy on Design Standards states that the recommended ratio of the flatter radius to sharper radius on compound curves should not exceed a ratio of 2:1. The compound curves reflect matching the existing alignment. However, all horizontal curve radii meet or exceed the design speed requirements.

DW 7: Substandard Rail Barrier on Bridges.
The design waiver request is for the existing bridge rail barrier to remain on existing bridges where existing shoulder width is not changed.

DW 8: Vertical Grade at Turkeycock Flyover Ramp.
The design waiver request is for the proposed vertical (upgrade) profile at the new flyover ramp at Turkeycock. AASHTO policy on Design Standards states that the recommended maximum vertical grade (upgrade) is 6%. Due to the existing terrain conditions and close proximity of the existing right of way adjacent to the NB GP Lanes the maximum vertical grade can not be obtained.

VI. TRAFFIC VOLUMES

The operational performance of I-95/I-395 was evaluated for three analysis years: existing conditions, opening year (2015) and design year (2030). Construction for the project is expected to start in 2009 and be completed in 2010. The year 2015 was used for the opening year analysis to take into consideration the ramp up period for the usage of HOV/Bus/HOT lanes.

A. TRAFFIC VOLUME COUNTS

Existing 24 hour traffic volumes throughout the study corridor were collected, compiled, and summarized. These volumes were used to develop an existing peak hour assignment for the entire I-95/I-395 corridor.

Mainline and Ramps (HOV lanes and GP Lanes)

In order to conduct the operational analysis for this IJR, volume data were compiled for the I-95/I-395 mainline, HOV system, and ramps from multiple VDOT databases. This information was supplemented through an extensive vehicle count program conducted throughout the study area. From the data collected and readily available, the count information was adjusted for seasonal variations and compared to VDOT control counts throughout the corridor.

OPERATIONAL PERFORMANCE WAS EVALUATED FOR EXISTING CONDITIONS, OPENING YEAR (2015) AND DESIGN YEAR (2030).

Based on the hourly traffic volume data, the peak hour at each interchange along the I-95/I-395 corridor was identified for the AM and PM peak time periods. The AM time period investigated was 6

am to 9 am and the PM time period investigated was 4 pm to 7 pm. The peak hour identified was the one hour period where the total ramp volumes at each interchange (entering and exiting) were the highest for the respective AM and PM time period. Once the AM and PM peak hours at each interchange location were identified, the following steps were taken:

1. Peak hour volumes were posted for each interchange ramp along the corridor.
2. Mainline and HOV counts at the Washington DC border and south of Garrisonville Road were used as volume control locations. Volume balancing along the corridor began and ended at these locations. Additional mainline count locations along the corridor (such as the Turkeycock HOV flyovers) were used as check locations to ensure that any manual adjustments to the ramp volumes did not cause substantial divergences from actual mainline counts.
3. Ramp volumes were manually adjusted to create a balanced network along I-95/I-395 from Garrisonville Road to the Washington DC line. Engineering judgment was used to adjust ramp counts. Judgments to increase or decrease peak hour counts slightly were strongly influenced by the counts in hours adjacent to the peak period.

The AM and PM peak hour traffic volumes for HOV lanes and GP Lanes for the existing conditions are shown in **Figure VI-1**.

Intersection Turning Movements

Existing peak hour turning movement volumes were used to develop an existing peak hour assignment at intersections along interchanging crossroads within the I-95/I-395 study area. Turning movement data from VDOT databases were compiled and supplemented by an extensive intersection turning movement count program. This information was used to develop a balanced intersection turn movement assignment as follows:

1. Raw intersection counts were posted along each interchanging crossroad in the I-95/I-395 corridor. The study area varies by crossroad, but generally includes the ramp terminal intersection(s) and one adjacent intersection on each crossroad.
2. If needed, raw count data were grown to a base year of 2005 by applying a nominal 1% per year growth factor from the time of the count to the year 2005.
3. Volumes along each crossroad were balanced where appropriate (such as between ramp terminal intersections and between intersections where no access is permitted). Balance between other intersections was checked for reasonableness, based on current land use and the presence of curb cuts between intersections. If needed, manual adjustments to the turn movement counts were made to reflect field conditions.

The AM and PM turning movements for intersections for the existing conditions are shown in **Figure VI-7**.

K Factor

K-factors shown in **Table VI-1** are obtained from VDOT traffic data for the year 2006. For I-95/ I-395 NB and SB GP lanes the K-factor generally varies between 0.065 and 0.091, with I-395 NB segment between Glebe Road and Washington Boulevard having a maximum value of 0.091 and I-95 SB segment between Franconia-Springfield Parkway and Fairfax County Parkway having a minimum value of 0.065. For the HOV lanes, the K factor varies between 0.086 and 0.132 with the I-395 HOV segment between Edsall Road

and Duke Street having the maximum value of 0.132 and the I-95 HOV segment between Fairfax County Parkway and Lorton Road having the minimum value of 0.086.

Average Daily Traffic (ADT) volumes are developed by applying the K factors to peak hour volumes. Typically K factors are applied to design hourly volumes but considering the urban nature of the I-95/I-395 corridor and congested conditions existing at many segments, differences between peak hour volumes and design hourly volumes are minor and therefore ignored.

Based on the trends seen above, a uniform K-factor value of 0.08 was assumed for all I-95/ I-395 NB and SB segments. For the HOV/Bus/HOT segments, K-factor value of 0.09 was assumed from the southern terminus at Garrisonville Road up to US Route 1 interchange. A K-factor value of 0.10 was assumed for the HOV/Bus/HOT segments north of US Route 1 interchange to the northern terminus. For cross-streets, the K-factors reported by VDOT are used**. Figure VI-2** shows existing and forecast ADT volumes for the study corridor.

Heavy Vehicle Percentage

On a typical day, approximately two (2) to eleven (11) percent of the vehicles on I-95/I-395 within the study area are heavy trucks.

THE PERCENTAGE OF HEAVY TRUCKS RANGES FROM TWO TO 11 PERCENT ALONG THE I-95/I-395 CORRDIOR.

B. TRAFFIC FORECASTS AND METHODOLOGY

Raw traffic forecast model data were post processed for future 2015 and 2030 Build and No-Build forecast scenarios on the mainline, HOV/Bus/HOT lanes, ramps, and interchanging crossroad intersections.

Mainline and Ramps (HOV/Bus/HOT lanes and GP Lanes)

The post processing of forecast mainline and ramp volumes were based on procedures detailed in *NCHRP 255, Highway Traffic Data for Urbanized Area Project Planning and Design.* Output from refined strategic models was obtained for 3-hour AM peak period and 3-hour PM peak period traffic volumes for the links within the study area. The future "raw" forecasts were refined using post-processing techniques that developed a balanced mainline and ramp assignment as follows:

1. Forecast 2015 and 2030 peak hour volumes were derived by estimating the percentage of 3-hour peak period vehicles traveling during the AM and PM peak hours.

   Current travel volumes observed in the corridor already exhibit peak spreading characteristics. It is highly likely that peak spreading will continue to take place in future year scenarios with additional volume demands on an already capacity constrained roadway network. Based on these anticipated conditions, the following factors were utilized to develop peak hour forecasts:

Factors Utilized to Develop Peak Hour Forecasts

2015 Build and No-Build		2030 Build and No-Build	
AM Peak Hour	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**
37%	36%	34%	34%

Forecast model outputs were refined using post-processing methodologies to adjust the volumes to reflect HOV/Bus/HOT corridor and ramp capacity constraints.

a. Traffic volumes for HOV/Bus/HOT roadway links for which the strategic model forecasts exceed the capacity of the link were adjusted and the excess volumes were reassigned to the GP lanes. The capacity of HOV/Bus/HOT facilities was assumed to be 1,950 vehicles per lane per hour, which will allow for HOV/Bus/HOT vehicles to travel at speeds of 45 mph or greater during the AM and PM peak hours.

THE CAPACITY OF HOV/BUS/HOT FACILITIES WAS ASSUMED TO BE 1,950 VEHICLES PER LANE PER HOUR.

b. Traffic volumes for ramp roadway links for which the strategic model forecasts exceed the capacity of the link were manually adjusted and the excess volumes were reassigned to alternate travel paths via adjacent interchanges, when reasonable alternative travel paths existed. The capacity of ramp links was assumed to be 1,600 vehicles per lane per hour.

2. Mainline and HOV forecasts at the Washington DC border and south of Garrisonville Road were used as volume control locations, and corridor balancing began and ended at these locations. Manual adjustments were made to ramp volumes throughout the corridor to create a balanced network along I-95/I-395 from Garrisonville Road to the Washington DC line.
3. Manually adjusted forecasts were compared to existing and interim year forecasts to ensure that forecast trends appeared reasonable based on overall growth and land use changes in the corridor. Areas of negative growth were evaluated and adjusted through volume reassignments when the reduction was not explainable.

Intersection Turning Movements

Forecast intersection turning movements were based on procedures detailed in *NCHRP 255, Highway Traffic Data for Urbanized Area Project Planning and Design.* As such, the development of forecast intersection turning movements was based on existing intersection count data and forecast approach link data. The process used to develop forecast intersection turn movements was as follows:

1. Existing turn movement volumes were posted along each interchanging crossroad
2. Existing turn percentages were calculated for each intersection approach movement.
3. Existing turn percentages were applied to forecast intersection approach volumes where no changes in travel patterns are expected. If future land use plans suggest a change in existing turning patterns, manual adjustments to the turn percentages were made to reflect the anticipated future turn percentages.
4. Forecast future link approach and departure volumes were obtained from the forecast model
5. NCHRP 255 procedures were used to compute forecast turning volumes from existing turning movement percentages (or expected future turning percentages in situations where land use changes reasonably suggest a change in patterns) and future approach and departure volumes. The iterative procedure was used to obtain convergence of future intersection inflow and outflow volumes.
6. Forecast volumes along each crossroad are balanced, where appropriate.

Future Traffic Volumes

The traffic forecasting methodology described above was used to develop traffic volumes for 2015 and 2030 No-Build options (no I-95/I-395 HOV/Bus/HOT lanes) as well as 2015 and 2030 Build options (with I-95/I-395 HOV/Bus/HOT Lanes). **Figures VI-3, through VI-6** show the forecast traffic volumes along the corridor

TRAFFIC VOLUMES ARE FORECASTED TO INCREASE IN THE CORRIDOR, WITH THE LARGEST INCREASES IN THE CENTRAL PORTION OF THE CORRIDOR.

for 2015 and 2030 No-Build and Build Alternatives. **Figure VI-7** shows the off-system intersection turning movements for the 2015 and 2030 No-Build and Build Alternatives.

C. TRAFFIC VOLUME ANALYSIS

To demonstrate how the proposed Project will affect traffic volumes at representative locations (segments) along the corridor in the design year (2030), a traffic volume analysis on the roadway segments at representative locations for the No-Build and Build Alternatives was performed. Traffic volumes are forecast to increase along the corridor for the Build Alternative compared to No-Build Alternative in 2030 for the AM and PM peak hour, as indicated in the table below.

2030 Traffic Volume Comparison

Location	Time/Direction	Projected Peak Hour Volume - 2030 (No-Build/Build)	Projected Difference - 2030 (Build vs. No-Build)
I-95; North of Garrisonville Rd	AM Peak/Northbound	7,470/7,860	+5%
I-95; North of Garrisonville Rd	PM Peak/Southbound	6,450/7,040	+9%
I-95; North of Dumfries Rd	AM Peak/Northbound	6,660/7,420	+11%
I-95; North of Dumfries Rd	PM Peak/Southbound	6,910/7,850	+14%
I-95; North of Gordon Blvd.	AM Peak/Northbound	11,540/12,950	+12%
I-95; North of Gordon Blvd.	PM Peak/Southbound	10,740/11,830	+10%
I-395: North of I-495	AM Peak/Northbound	9,690/10,740	+11%
I-395: North of I-495	PM Peak/Southbound	9,330/10,480	+12%
I-395; at 14th Street	AM Peak/Northbound	11,760/12,250	+4%
I-395; at 14th Street	PM Peak/Southbound	10,400/10,500	+1%

The largest increases are anticipated in the central portion of the corridor with marginal increases at the northern and southern termini consistent with developing land use patterns in the region. This demonstration highlights the latent travel demand in the corridor for the Build Alternative above that in the No-Build Alternative.

VII. TRAFFIC ANALYSIS

The traffic analysis consisted of analyzing the I-95/I-395 GP lanes, HOV/Bus/HOT lanes, and cross street intersections along the I-95/I-395 corridor. Several different software tools were utilized for the traffic analysis, determination of the proper tool was based on the capabilities of the various traffic analysis software tools. Highway Capacity Software (HCS) based on Highway Capacity Manual (HCM) methodologies was utilized as the primary analysis tool for the GP, HOV/Bus/HOT lanes and cross street intersections.

For the GP lanes and HOV/Bus/HOT lanes, each facility was subdivided into segments and classified as basic freeway, weave, or ramp junction segment based on the sequencing of ramps, number of lanes, and spacing between ramps. The benefit of the isolated segment analysis in HCS is that individual bottlenecks, which can be created from ramping changes can be identified, and they are not masked by congestion propagating upstream from other bottlenecks. In addition, the northern portion of the corridor (Washington Boulevard to the north) has a complex geometric design with overlapping ramp influence areas on the right-side and left-side of the GP lanes. The application of the isolated segment analysis enabled several scenarios to be evaluated in HCS, and for consistency, the scenario resulting in the lower LOS (higher density) was utilized.

For the cross street intersections, HCS Intersection Module was utilized as the base analysis tool. On arterial streets, the adjacent intersections, including progression between adjacent intersections has a significant impact on the operation of an isolated intersection. The HCM analysis may portray a better or worse picture than actual field operations under congested conditions because analysis methodologies do not take into consideration upstream or downstream effects. Therefore, where corridor intersections were substantially impacted by other intersections on the cross street the HCS analysis was supplemented with Synchro/SimTraffic or VISSIM micro-simulation modeling.

This project overlaps modifications that are being proposed to I-95/I-395/I-495 Interchange (Springfield Interchange) and documented in the Springfield IMR that is currently being developed (See **Appendix E**). The LOS results in the vicinity of the Springfield interchange are obtained from the I-495 Capital Beltway HOV/Bus/HOT Lanes IMR, but included in this report for completeness.

The operational performance of the I-95/I-395 HOV/Bus/HOT Lane project was analyzed for both the peak and non-peak direction during the AM and PM peak hours for the following conditions:

- Existing
- 2015 No-Build
- 2015 Build
- 2030 No-Build
- 2030 Build

During the AM peak hour, the peak direction in the I-95/I-395 corridor is northbound, and the non-peak direction is southbound. During the PM peak hour, the peak direction in the I-95/I-395 corridor is southbound, and the non-peak direction is northbound.

For the GP lanes and HOV/Bus/HOT lanes, the existing conditions analysis was conducted using the existing volumes summarized in **Figure VI-1**. The analysis of 2015 No-Build and Build, and 2030 No-Build and Build conditions was conducted using the future year volumes summarized in **Figures VI-3, VI-4, VI-5 and VI-6**, respectively. The number of lanes used in the operational analysis for each roadway section for existing, No-Build, and Build scenarios are shown in **Figures V-1, V-2, and V-3**, respectively.

HCS Methodology

The HCS analysis for basic freeway, weaving and ramp segments used the following global input values for existing and future conditions:

- Peak Hour Factor (PHF) – 0.95
- Terrain Type – Level or Rolling (Depending on profile)
- Mainline Free-flow Speed – 70 miles per hour (mph) (typical). Reduced to 60 mph or 65 mph in locations where horizontal curvature dictated reduction.
- Driver Population Factor – 1.00

All other input values, including traffic volumes/projections, number of lanes, lane width, lateral clearance, interchange density, and percent heavy vehicles, were specific to the facility, location, time of day, and analysis year.

Methodology for Comparison of No-Build and Build Conditions

The key outcome of the traffic analysis is the impact that the proposed project will have on the corridor operations, which can be determined by comparing the No-Build and Build conditions. LOS, which ranges from LOS A (free flow) to LOS F (breakdown in flow), qualitatively identifies the operations of a given segment of roadway based on density (basic freeway segments, weave, ramp junctions) or delay (intersections). However, a comparison of LOS alone may not be adequate, as density and delay are a continuum. Therefore, a small change in density or delay may change the LOS by one letter rating, while in reality the change is not substantial.

THE BUILD AND NO-BUILD COMPARISON WERE BASED ON LOS AND CHANGE IN DENSITY/DELAY.

Therefore, to compare the Build and No-Build conditions in the year 2015 and 2030, a comparison based on LOS and change in density/delay was developed. Following is a summary of the comparison methodology of the No-Build and Build condition.

The comparison of the No-Build and Build condition was categorized by segment as positive, neutral, or negative. A positive rating indicated that the Build condition operated substantially better than the No-Build condition. A negative rating indicated the Build condition operated substantially worse than the No-Build conditions, and a neutral rating indicated no substantial difference between the Build and No-Build conditions. For the comparison, the segments were classified according to the conditions shown in the table below.

Criteria for Build versus No-Build Comparison

	Positive Comparison (Build vs No-Build)	Neutral Comparison (Build vs No-Build)	Negative Comparison (Build vs No-Build)
Basic Freeway	*LOS A-E:* Improvement in LOS; and No-Build density is 20 percent or greater than Build density. *LOS F:* No-Build flow rate is 10 percent or greater than Build flow rate.	*LOS A-E:* No change in LOS; or Build and No-Build densities within 20 percent. *LOS F:* Build and No-Build flow rates within 10 percent.	*LOS A-E:* Reduction in LOS; and Build density is 20 percent or greater than No-Build density. *LOS F:* Build flow rate is 10 percent or greater than No-Build flow rate.
Ramp Junction	*LOS A-F:* Improvement in LOS; and No-Build density is 20 percent or greater than Build density.	*LOS A-F:* No change in LOS; or Build and No-Build densities within 20 percent.	*LOS A-F:* Reduction in LOS; and Build density is 20 percent or greater than Build density.
Weave	*LOS A-F:* Improvement in LOS; and No-Build density is 20 percent or greater than Build density.	*LOS A-F:* No change in LOS; or Build and No-Build densities within 20 percent.	*LOS A-F:* Reduction in LOS; and Build density is 20 percent or greater than No-Build density.
Intersection	*LOS A-F:* Improvements in LOS; and No-Build delay is 40 percent or greater than Build delay.	*LOS A-F:* No change in LOS; or Build and No-Build delay within 40 percent.	*LOS A-F:* Reduction in LOS; and Build delay is 40 percent or greater than No-Build delay.

The criteria for defining a substantial change in density/delay was based on the percentage difference in density/delay between adjacent LOS letter ratings in the HCM. For the basic freeway segments (LOS A-LOS E), the difference in density of the adjacent letter rating of the upper and lower limits of the LOS boundaries ranged from 63 percent (LOS A) to 29 percent (LOS E), while the difference in density of the upper and lower limits of the boundaries for ramp junctions and weave segments ranged from 100 percent (LOS A) to 23 percent (LOS E). Therefore, for the basic freeway segments (LOS A-LOS E), ramp junctions and weave segments, 20 percent was conservatively chosen to represent a substantial change in operations, as it is on the lower end of the percent change in densities for LOS as defined in the HCM. HCM does not report densities for segments that have a breakdown in flow (LOS F); therefore, flow rate was utilized to identify segments with substantial operational changes. For basic freeway segments (LOS F), the difference in flow rate of the upper and lower limits of the LOS boundaries ranged from 64 percent (LOS A) to 10 percent (LOS E). Therefore, for the basic freeway segments (LOS F), 10 percent was conservatively chosen to represents a substantial change in operations, as it is on the lower end of the percent change in flow rates for LOS as defined in the HCM.

Similarly for intersections, the difference in delay for the upper and lower limits of the LOS boundaries ranged from 100 percent (LOS A) to 45 percent (LOS E). Therefore, for signalized intersections, 40 percent was conservatively chosen to represent a substantial change in operations, as it is on the lower end of the percent change in delay for LOS as defined in the HCM.

A. EXISTING CONDITIONS

The existing conditions analysis on I-95/I-395 represents the baseline conditions and reflects the current traffic operations in the I-95/I-395 corridor. In the existing conditions, the I-95/I-395 reversible facility is two lanes open to HOVs (three or more occupants).

The LOS results for the AM and PM peak hour existing conditions on I-95/I-395 are shown in **Figures VII-1, VII-2 and VII-7**, respectively. The input data that was utilized to determine the AM peak hour LOS is shown in **Appendix C Table 1** (basic freeway segments), **Appendix C Table 11** (weave segments), and **Appendix C Table 21** (ramp junctions), and the input data that was utilized to determine the PM peak hour LOS is shown in **Appendix C Table 2** (basic freeway segments), **Appendix C Table 12** (weave segments), and **Appendix C Table 22** (ramp junctions).

The following sections describe the segments that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) in the existing conditions. All other segments operate at LOS D or higher.

1. AM Peak Hour (Existing Conditions)

During the morning peak hour, the peak direction in the I-95/I-395 corridor is northbound. In the northbound direction, I-95/I-395 generally operates at LOS C south of Gordon Boulevard and at LOS C or LOS D north of Gordon Boulevard. However, there are a few segments of northbound I-95/I-395 GP lanes that operate at or near capacity (LOS E).

I-95/I-395 Northbound Basic Freeway Segments

The following northbound I-95/I-395 basic freeway segments operate at or near capacity (LOS E) during the AM peak hour as a result of volumes approaching capacity: Lorton Road to Fairfax County Parkway, Duke Street to Seminary Road, King Street to Shirlington, and Washington Boulevard to Hayes Street.

I-95/I-395 Northbound Weave Segments

The following northbound I-95/I-395 weave segments operate at or near capacity (LOS E) during the AM peak hour: HOV entrance south of Dale Street, Seminary Road to King Street and Shirlington to Glebe Road.

I-95/I-395 Northbound Ramp Junctions

All of the northbound ramp junctions on northbound I-95/I-395 operate at an acceptable LOS during the existing AM peak.

I-95/I-395 Southbound

In the southbound (non-peak direction), during the morning peak hour, the GP lanes typically operate at LOS B or LOS C, which is acceptable.

I-95/I-395 HOV Lanes

During the morning peak hour, the reversible HOV lane operates in the northbound direction. The reversible HOV lane operates at LOS C or better in the northbound direction from the southern project limit to Shirlington and typically at LOS C or LOS D from Shirlington to the northern project limit. Therefore, the HOV lane operations are acceptable in the existing conditions in the AM peak hour. At the northern end of the project, the reversible HOV transitions to bidirectional express lanes. Due to the high volume of traffic (2,040 vehicles per hour (vph), which is at the capacity of a one-lane ramp) on the existing diverge near Boundary Channel Drive, the diverge operates at LOS F during the AM peak hour.

Collector Distributor Roads

At several locations in the I-95/I-395 corridor, including Dale Boulevard to Opitz Boulevard, Prince William Parkway (northbound), Seminary Road, Glebe Road (southbound) and Washington Boulevard there are existing collector distributor roads. Due to the unique characteristics of collector distributor roads, including reduced operating speeds and one-lane segments, the HCS methodology is not directly applicable. Since the collector distributor roads are part of the roadway network in the I-95/I-395 corridor, it is important that the collector distributor roads also provide acceptable traffic operations. Therefore, a volume to capacity analysis was conducted on the collector distributor roads to ensure that they provide acceptable operations.

In the existing AM peak hour, all of the collector distributor roads are below capacity and provide acceptable operations.

AM Peak Hour (Existing Conditions) Summary

During the existing AM peak hour, northbound (peak direction) I-95/I-395 GP lanes generally have acceptable LOS, with a few isolated segments that operate at or near capacity (LOS E). Even though the segments that operate at capacity in the morning peak hour are located at isolated locations, the effect of the congestion may propagate upstream and impact adjacent segments. Therefore, the actual existing congestion in the AM peak hour is substantially worse than the HCS results, due to the affect of congestion on adjacent segments. However, as stated previously, the proper tools are being utilized to analyze the performance of the corridor for this situation. During the existing AM peak hour, the southbound (non-peak direction) I-95/I-395 GP lanes and the HOV lane operate at acceptable LOS.

2. PM Peak Hour (Existing Conditions)

During the evening peak hour, the peak direction in the I-95/I-395 corridor is southbound. In the southbound direction, I-95/I-395 generally operates at LOS C and LOS D. There are a few segments of the southbound I-95/I-395 GP lanes that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) in the PM peak of the existing conditions.

I-95/I-395 Southbound Basic Freeway Segments

As a result of volumes approaching capacity, the following basic freeway segments on southbound I-95/I-395 GP lanes operate at capacity during the PM peak hour: Washington Boulevard and Duke Street to Edsall Road.

I-95/I-395 Southbound Weave Segments

In the PM peak hour, the weave segment on the southbound I-395 GP lanes at Boundary Channel has a breakdown in flow (LOS F) and the weave at Duke Street operates at or near capacity (LOS E) due to the short weave lengths and moderate traffic volumes.

I-95/I-395 Southbound Ramp Junction Segments
As a result of the relatively high existing ramp volume, the southbound I-395 GP exit to Jefferson Davis Highway, I-395 GP exit to the HOV near Edsall Road, and I-95 exit to Dumfries Road operate at LOS E during the PM peak hour.

I-95/I-395 Northbound
During the evening peak hour, the northbound I-95/I-395 GP lanes (non-peak direction) typically operate at LOS B and LOS C from the southern terminus near Garrisonville Road to Edsall Road, and operate at LOS B, LOS C, or LOS D from Edsall Road to the northern project terminus. Therefore, the non-peak (northbound) direction operates at acceptable LOS during the PM peak hour.

I-95/I-395 HOV Lanes
During the evening peak hour, the reversible HOV lane operates in the southbound direction at acceptable LOS (LOS D or better). The I-395 express lane southbound diverge near Boundary Channel, located north of the project, operates with a breakdown in flow (LOS F) in the existing PM peak, as a result of the ramp volume (1,990 vph) near the capacity of a single lane ramp.

Collector Distributor Roads
In the existing PM peak hour, the collector distributor roads operate at an acceptable LOS based on a volume to capacity comparison, except for the southbound segment south of Glebe Road which has a breakdown in flow.

PM Peak Period (Existing Conditions) Summary
During the existing PM peak hour, southbound (peak direction) I-95/I-395 GP lanes generally have acceptable LOS, with a few isolated segments that operate at or near capacity (LOS E) or with a breakdown in flow (LOS F). Even though the segments identified above operate at or near capacity (LOS E) are at isolated locations, the congestion from these locations impact adjacent segments and results in reduced operations. However, as stated previously, in our judgment the proper tools are being utilized to analyze the performance of the corridor for this situation. The existing northbound I-95/I-395 GP lanes and HOV lanes provide an acceptable LOS in the PM peak hour.

B. 2015 NO-BUILD ANALYSIS

The 2015 No-Build conditions analysis on I-95/I-395 represents the resulting traffic operations if no improvements other than those currently programmed are implemented. There are several improvements, currently programmed, that will be implemented in the corridor and will impact the traffic operations on the I-95/I-395 GP lanes. These improvements are represented in the 2015 No-Build conditions, but were not operational in the existing conditions, as noted below:

- On southbound I-95 GP lanes, an auxiliary lane (fourth lane) from Fairfax County Parkway to Gordon Boulevard.
- On northbound I-95 GP lanes, an auxiliary lane (fourth lane) from Gordon Boulevard to Lorton Road.
- Relocation of the northbound I-95 GP lane entrance to the HOV facility near Franconia Road.
- Relocation of the southbound HOV lane exit to the I-95 southbound GP lanes near Franconia Road.
- Addition of access between the I-495 HOV/Bus/HOT Lanes and the I-95 HOV lanes. In the AM peak hour, the additional access consists of a northbound I-95 HOV exit to the I-495 eastbound and

westbound HOV/Bus/HOT lanes and an I-495 eastbound/westbound HOV/Bus/HOT lane entrance to northbound I-95 HOV lanes. In the PM peak hour, the additional access consists of a southbound I-95 HOV exit to the I-495 eastbound and westbound HOV/Bus/HOT lanes and an I-495 eastbound/westbound HOV/Bus/HOT lane entrance to the southbound I-95 HOV lane.

The LOS results for the AM and PM peak hour 2015 No-Build conditions on I-95/I-395 are shown in **Figures VII-3, VII-4** and **VII-7** respectively. The input data that was utilized to determine the 2015 No-Build AM peak hour LOS is shown in **Appendix C Table 3** (basic freeway segments), **Appendix C Table 13** (weave segments), and **Appendix C Table 23** (ramp junctions), and the input data that was utilized to determine the PM peak hour LOS is shown in **Appendix C Table 4** (basic freeway segments), **Appendix C Table 14** (weave segments), and **Appendix C Table 24** (ramp junctions).

The following sections describe the segments that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) during the 2015 No-Build conditions. All other segments operate at LOS D or higher.

1. AM Peak Hour (2015 No-Build Conditions)

During the morning peak hour, in the northbound (peak) direction, I-95/I-395 generally operates at a LOS C or LOS D; however, there are also several locations that are projected to operate at or near capacity (LOS E) or have a breakdown in flow (LOS F).

I-95/I-395 Northbound Basic Freeway Segments

With the addition of the northbound auxiliary lane, the basic freeway segment between Lorton Road and Fairfax County Parkway improved from a LOS E in the existing conditions to a LOS D in the 2015 No-Build conditions. The northbound basic freeway segment on the I-395 GP lanes from Duke Street to Seminary and King Street to Shirlington which operated at LOS E during the existing conditions has reduced to a LOS F in the 2015 No-Build condition. The basic freeway segment between Washington Boulevard and Hayes Street remained at LOS E in both the existing and 2015 No-Build condition during the AM peak.

In addition to the basic freeway segments that were at or near capacity (LOS E) during the existing conditions, the northbound I-95/I-395 GP lane segments from Prince William Parkway to Gordon Boulevard, Edsall Road to Duke Street, Seminary Road to King Street, and Glebe Road to Washington Boulevard are projected to operate at or near capacity (LOS E), while the segment from Joplin Road to the HOV entrance (south of Dumfries Road) is projected to operate with a breakdown in flow (LOS F) in the 2015 No-Build condition. Therefore, there is a reduction in operations of the basic segments on northbound I-95/I-395 between the existing and 2015 No-Build condition.

I-95/I-395 Northbound Weave Segments

Similar to the existing northbound conditions in the AM peak hour, the weave segments on the I-395 GP lanes from Seminary Road to King Street and Shirlington to Glebe Road operate at or near capacity (LOS E). In addition, the weave segment at the HOV entrance south of Dale Boulevard on northbound I-95 will worsen from a LOS E in the existing AM peak to a breakdown in flow (LOS F) by the year 2015 AM peak.

I-95/I-395 Northbound Ramp Junction Segments

There is a general reduction in the operation of the ramp junction segments between the existing conditions and the 2015 AM peak No-Build conditions. In the year 2015, the northbound I-95 GP lane exit to Prince

William Parkway will operate at or near capacity (LOS E), while the Duke Street and eastbound King Street entrance to the I-395 GP lanes and the I-395 GP lane exit to Seminary Road will have a breakdown in flow (LOS F). Each of these ramps operated at LOS D or better in the existing AM peak hour.

I-95/I-395 Southbound
In the southbound (non-peak) I-395 segments, there is a reduction in operations from the existing conditions to the 2015 No-Build condition in the AM peak, with the segments at Boundary Channel Drive operating at or near capacity (LOS E) or with a breakdown in flow (LOS F).

I-95/I-395 HOV
In the peak period during the No-Build conditions, the I-95/I-395 reversible facility is two lanes open to HOVs (three or more occupants). There is a reduction in the operations of the HOV lane between the existing conditions and the 2015 No-Build condition during the AM peak with the segments between Shirlington and Washington Boulevard operating at or near capacity (LOS E). Similar to the existing conditions, the southbound express lanes exit to Boundary Channel, located north of the project, will operate with a breakdown in flow (LOS F) due to the high exit ramp volume, in the 2015 No-Build condition during the AM peak.

Collector Distributor Roads
All I-95/I-395 collector distributor roads are projected to be under capacity, with the exception of the northbound weave on the collector distributor road at Dale Boulevard, which is projected to have a breakdown in flow (LOS F).

AM Peak Hour (2015 No-Build) Summary
By comparing the AM peak hour in the existing conditions with the 2015 No-Build conditions, there is a reduction in traffic operations and LOS in the I-95/I-395 corridor resulting from growth and additional travel demand in the corridor. On northbound I-95/I-395, there are additional segments that will operate at or near capacity (LOS E) or have a breakdown in flow (LOS F). In addition, isolated segments in the non-peak (southbound) I-395 GP lanes and HOV lanes will also operate at LOS E or LOS F in the AM peak by the year 2015.

It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

2. PM Peak Hour (2015 No-Build Conditions)
During the evening peak hour, the southbound (peak direction) I-95/I-395 GP lanes generally operates at LOS C and LOS D; however, there are also several locations that will operate at or near capacity (LOS E).

I-95/I-395 Southbound Basic Freeway Segments
Similar to the existing conditions, the basic freeway segments on southbound I-395 GP lanes from Duke Street to Edsall Road will operate at or near capacity (LOS E) in the 2015 No-Build condition during the PM peak hour. In addition, the basic freeway segment on southbound I-95 from Gordon Boulevard to Prince William Parkway, Dale Boulevard to Dumfries Road and Joplin Road to Russell Road will operate at or near capacity (LOS E) in the 2015 PM peak No-Build condition.

I-95/I-395 Southbound Weave Segments
Similar to the PM peak hour existing conditions, the weave segment on the southbound I-395 GP lanes at Boundary Channel will have a breakdown in flow and the weave at Duke Street will operate at or near capacity (LOS E).

I-95/I-395 Southbound Ramp Junction Segments
Similar to the existing conditions, the southbound I-395 GP lanes exit to Jefferson Davis Highway and to the HOV near Edsall Road will operate at LOS E during the PM peak hour in the 2015 No-Build condition. In addition, the Lorton entrance and the HOV entrance (south of Dumfries Road) to southbound I-95 will operate at or near capacity (LOS E) in the year 2015 PM peak.

I-95/I-395 Northbound
By the year 2015, congestion begins to develop in the northbound (non-peak) I-95/I-395 GP lanes, if additional improvements are not implemented. The basic freeway segment between Joplin Road and Dumfries Road and the basic freeway segments between Edsall Road and Seminary Road are projected to operate at or near capacity (LOS E).

I-95/I-395 HOV Lanes
During the evening peak hour, the reversible HOV lane will operate at an acceptable LOS (LOS D or better). However, there continues to be a breakdown in flow in the southbound express lane at the exit near Boundary Channel Drive. In addition, by the year 2015, it is projected that the transition to the HOV lanes south of Eads Street will also operate at or near capacity (LOS E).

Collector Distributor Roads
Congestion continues to develop on the collector distributor roads, if improvements are not implemented. Similar to the existing PM conditions, the weave on the southbound collector distributor road near Glebe Road will have a breakdown in flow. In addition, the weave on the southbound collector distributor road at Dale Boulevard and the weave on the northbound collector distributor road at Prince William Parkway are projected to operate at or near capacity (LOS E).

PM Peak Hour (2015 No-Build) Summary
There is a general reduction in LOS on the southbound I-95/I-395 GP lanes during the PM peak hour between the existing year and the 2015 No-Build conditions. In addition, segments on the northbound (non-peak) I-95/I-395 GP lanes begin to show the potential for congested conditions. The LOS exhibits indicate several bottleneck locations with reduced traffic operations. It is anticipated that these segments will also negatively impact the traffic operations in the adjacent upstream segments as the congestion propagates upstream. However, as stated previously, in our judgment the proper tools are being utilized to analyze the performance of the corridor for this situation.

C. 2015 BUILD ANALYSIS

The 2015 Build condition represents the opening year of the proposed improvements. Specific components of the Build Alternative include:

THE 2015 BUILD CONDITION REPRESENTS THE OPENING YEAR OF THE PROPOSED IMPROVEMENTS.

- Widening of the reversible HOV facility from two-lanes to three lanes in each direction.

- Conversion of the reversible HOV lane to a reversible HOV/Bus/HOT lane facility.
- Extension of the HOV/Bus/HOT facility further south to Garrisonville Road.
- Ramping and access changes to better accommodate the proposed improvements.

A complete description of the Build Alternative is located in **Section IV.B. Build Alternative**.

The traffic analysis is based on the proposed I-95/I-395 corridor improvements as of December 2008. As the project development process continues, it is important that the analysis continue to determine the operational impacts of any changes to the proposed design.

The LOS results for the AM and PM peak hour 2015 Build conditions on I-95/I-395 are shown in **Figures VII-3, VII-4**, and **VII-7** respectively. The input data that was utilized to determine the 2015 Build AM peak hour LOS is shown in **Appendix C Table 5** (basic freeway segments), **Appendix C Table 15** (weave segments), and **Appendix C Table 25** (ramp junctions), and the input data that was utilized to determine the PM peak hour LOS is shown in **Appendix C Table 6** (basic freeway segments), **Appendix C Table 16** (weave segments), and **Appendix C Table 26** (ramp junctions).

The following sections describe the segments that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) during the 2015 Build conditions. All other segments operate at LOS D or higher.

1. AM Peak Hour (2015 Build Conditions)

Similar to the 2015 No-Build condition in the morning peak hour, northbound (peak direction), I-95/I-395 generally operates at a LOS C or LOS D with several locations that are projected to operate at or near capacity (LOS E) or have a breakdown in flow (LOS F).

I-95/I-395 Northbound Basic Freeway Segments

The northbound I-95/I-395 basic freeway segments in the 2015 Build condition operate slightly better than the same segments in the 2015 No-Build condition in the AM peak hour. The northbound I-95/I-395 GP lane segment from Prince William Parkway to Gordon Boulevard, Glebe Road to Washington Boulevard, and Washington Boulevard to Hayes Street improved from a LOS E (2015 No-Build) to a LOS D (2015 Build), while the basic freeway segment between Edsall Road to Duke Street improved from a LOS E (2015 No-Build) to a LOS C (2015 Build). In addition, the basic freeway segment between King Street and Shirlington improved from LOS F (2015 No-Build) to LOS E (2015 Build). One of the basic freeway segments between Seminary Road and King Street (near King Street) improved from LOS E to LOS D. The basic freeway segment between Seminary Road and King Street (near Seminary Road) remained at LOS E with an improvement in density from 43.8 pcpmpl (2015 No-Build) to 36.2 pcpmpl (2015 Build). The basic freeway segment from Duke Street to Seminary and Joplin Road to the entrance to the HOV (south of Dumfries Road) remained at a LOS F in both the 2015 No-Build and Build condition.

I-95/I-395 Northbound Weave Segments

The I-95/I-395 northbound weave segments show a general improvement between the No-Build and Build condition in the year 2015 AM peak hour. Although the weave segment at the HOV/Bus/HOT entrance south of Dale Boulevard remains at LOS F, the density improves from 50.9 pcpmpl to 46.4 pcpmpl (LOS E range is from 35.0 to 43.0 pcpmpl). Similarly, the weave segment between Seminary Road and King Street remains at LOS E; however, the density improves from 39.6 pcpmpl in 2015 No-Build to 35.4 pcpmpl in 2015

Build (LOS D range is from 28.0 to 35.0 pcpmpl). The northbound weave segment between Shirlington and Glebe Road improved from LOS E in the 2015 No-Build condition to LOS D in the 2015 Build condition.

I-95/I-395 Northbound Ramp Junction Segments
In the year 2015, there is a general improvement in the traffic operations at the ramp junctions between the No-Build and Build conditions in the AM peak hour. The northbound I-95 GP lane exit to Prince William Parkway improves from LOS E in the No-Build condition to LOS C in the Build condition. Similarly, the Duke Street entrance to northbound I-395 GP lanes and the northbound I-395 GP lanes exit to Seminary Road improve from LOS F in the No-Build condition to LOS E in the Build condition. The eastbound King Street entrance to northbound I-395 improves from LOS F in the 2015 No-Build condition to LOS D in the 2015 Build condition.

However, the Build scenario will cause a reduction in LOS from LOS D to LOS F at the Joplin Road entrance ramp to the northbound I-95 GP lanes and the I-95 GP lanes entrance to the HOV/Bus/HOT lanes south of Dumfries Road. Even though these two ramps show a relatively small increase in density between the No-Build and Build scenario (Joplin Road: 31.7 pcpmpl to 34.0 pcpmpl and HOV/Bus/HOT: 32.6 pcpmpl to 36.5 pcpmpl), there is a significant change in LOS because the values are located on the LOS boundaries. The change in density is a result of an increase in volumes between the No-Build and Build scenario. There is currently a study underway to extend the HOV/Bus/HOT lane to the south. If that project proves feasible, it is anticipated that it will improve the traffic operations at this location by shifting traffic from the GP lanes to the HOV/Bus/HOT lanes.

I-95/I-395 Southbound
Similar to the 2015 No-Build conditions, the southbound I-95/I-395 GP lanes are anticipated to operate at an acceptable LOS (LOS D or better) in the year 2015 AM peak hour, except for the segments near Boundary Channel, which are anticipated to operate at or near capacity (LOS E) or with a breakdown in flow (LOS F).

I-95/I-395 HOV/Bus/HOT Lanes
Implementing the proposed HOV/Bus/HOT lanes will improve the operations on the HOV/Bus/HOT lane in the segment between Shirlington and Washington Boulevard from LOS E in the 2015 No-Build condition to LOS D in the 2015 Build condition. There is anticipated to be a high demand (2,050 vph) for the exit ramp at Franconia Springfield which approaches the capacity of a one-lane ramp. This causes the upstream merge segment to operate at LOS E and the Franconia Springfield diverge to operate at LOS F. The HCS output indicates that these segments will operate between 51.2 mph and 56.1 mph. Therefore, this segment is anticipated to operate at speeds exceeding SAFETEA-LU guidelines for the HOV/Bus/HOT lanes. If there becomes an operational concern at this location, the toll can be increased to reduce the demand so that acceptable operations result.

Similar to the 2015 No-Build condition, the southbound express lanes exit to Boundary Channel, located north of the project, will operate with a breakdown in flow (LOS F) due to the high exit ramp volume, in the 2015 Build condition during the AM peak.

Collector Distributor Road
Similar to the 2015 No-Build condition, the Dale Boulevard weave at the northbound collector distributor road is projected to operate at a LOS F in the 2015 AM peak hour.

AM Peak Hour (2015 Build) Summary

There is a slight improvement of the traffic operations of the Build condition compared to the No-Build condition in the northbound (peak direction) I-95/I-395 GP lanes during the AM peak hour in the year 2015. This slight improvement is reasonable, as the proposed HOV/Bus/HOT lane improvements will result in additional capacity and better utilization of the HOV/Bus/HOT lane, and have a minor shift in traffic from the northbound I-95/I-395 GP lanes to the HOV/Bus/HOT lane. From an I-95/I-395 corridor perspective, the majority of the southbound (non-peak) I-95/I-395 GP lanes remain at an acceptable LOS during the 2015 Build AM peak.

It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

The majority of the connections between the GP lanes and the HOV/Bus/HOT lane operate at an acceptable LOS (LOS D or better) or an improvement over the No-Build conditions. The entrance to the HOV/Bus/HOT lane at the southern terminus of the project is projected to operate at LOS F, as a result of volume exceeding capacity in the GP lanes and a high demand (1,640 vph) during the 2015 AM peak. There is currently a study underway to extend the project to the south. It is anticipated that a future southern extension will reduce the demand on the northbound GP lanes and entrance to the HOV/Bus/HOT lane (south of Dumfries Road). During the 2015 AM peak, the HCS results indicate that the proposed HOV/Bus/HOT lanes will operate at a speed greater than 45 mph. It is anticipated that the HOV/Bus/HOT lane basic segment at Franconia Springfield will operate at or near capacity, but still at speeds exceeding SAFETEA-LU guidelines for HOV/Bus/HOT lanes. This will provide trip time reliability for bus vehicles utilizing the HOV/Bus/HOT lanes. In addition, the traffic demand for the I-95/I-395 HOV/Bus/HOT lanes can be managed in real time by adjusting the toll, so that they operate at an acceptable LOS.

2. PM Peak Hour (2015 Build Condition)

Similar to the 2015 No-Build conditions in the evening peak hour, the southbound (peak direction) I-95/I-395 GP lanes generally operates at LOS C and LOS D, however there are also several locations that will operate at or near capacity (LOS E) in the 2015 Build condition.

I-95/I-395 Southbound Basic Freeway Segments

By comparing the northbound basic freeway segments in the 2015 Build and No-Build conditions, there is generally a minor improvement in LOS as a result of the proposed HOV/Bus/HOT lane improvements. The basic freeway segment from Duke Street to Edsall Road, Dale Boulevard to Dumfries Road and Joplin Road to Russell Road improves from LOS E in the 2015 No-Build condition to LOS D in the 2015 Build condition. The basic freeway segment between Gordon Boulevard and Prince William Parkway will remain at LOS E; however, the results indicate a minor increase in density from 37.9 pcpmpl in the No-Build condition to 38.0 pcpmpl in the Build condition. There is one southbound I-95 freeway segment, located between Prince William Parkway and Opitz Boulevard that changes from LOS D (34.0 pcpmpl) in the No-Build condition to LOS E (35.8 pcpmpl) in the Build condition, which is a minor increase in density.

I-95/I-395 Southbound Weave Segments

There is a slight improvement in the southbound I-95/I-395 weave segments between the 2015 No-Build condition to the 2015 Build condition. Although the weave segments on the southbound I-395 GP lanes at Duke Street remains at LOS E in both the Build and No-Build conditions, there is a slight improvement in

density from the No-Build (40.7 pcpmpl) to the Build (37.0 pcpmpl) condition. Although the weave segment at Boundary Channel remains at LOS F in both the 2015 No-Build and Build condition, there is a similar slight improvement in density. Due to a change in geometry, the weave between the HOV/Bus/HOT lane entrance south of Russell Road and the westbound Garrisonville Road exit on southbound I-95 will operate at LOS E.

I-95/I-395 Southbound Ramp Junction Segments

The proposed improvements result in an improvement in the operation of the ramp junctions from the 2015 No-Build condition to the 2015 Build condition in the PM peak. The HOV diverge (north of Edsall Road) improves from LOS E in the 2015 No-Build condition to LOS D in the 2015 Build condition in the PM peak. Similarly, the Lorton entrance ramp to southbound I-95 improves from LOS E in the 2015 No-Build condition to LOS C in the 2015 Build condition. In addition, the LOS on the HOV entrance (south of Dumfries Road) to southbound I-95 GP lanes improves from LOS E in the No-Build condition to a weave segment (due to a change in geometry) with a LOS C in the 2015 Build condition. Although the exit to Jefferson Davis Highway remains at LOS E, there is a slight improvement in density from 40.4 pcpmpl in the 2015 No-Build condition to 36.4 pcpmpl in the 2015 Build condition. However, there is one merge segment (Gordon Boulevard entrance to the southbound I-95 GP lanes that will result in a slight reduction in LOS between the 2015 No-Build condition (LOS D: density 34.9 pcpmpl) and the 2015 Build condition (LOS E: density 36.2 pcpmpl) during the PM peak.

I-95/I-395 Northbound

Similar to the 2015 No-Build conditions, there are isolated locations in the northbound (off-peak) I-95/I-395 GP lanes that operate at LOS E. There is no change in the operation of the basic freeway segment (LOS E: density 35.6 pcpmpl) located between Joplin Road and Dumfries Road. However, the basic freeway segment on northbound I-395 between Edsall Road and Duke Street remains at LOS E, although there is a slight increase in density from 36.3 pcpmpl in the No-Build condition to 38.8 pcpmpl in the Build condition. Similarly, the basic freeway segment on northbound I-395 between Duke Street and Seminary Road remains at LOS E in the No-Build and Build conditions, even though the density increases slightly from 40.9 pcpmpl in the No-Build condition to 43.6 pcpmpl in the Build condition in the 2015 PM peak. In addition, the northbound I-395 GP lane diverge to Seminary Road is slightly reduced from LOS D (density: 34.9 pcpmpl) in the 2015 PM No-Build condition to LOS E (density: 35.6 pcpmpl) in the 2015 PM Build condition.

I-95/I-395 HOV/Bus/HOT Lanes

Similar to the 2015 No-Build conditions, during the evening peak hour, the reversible HOV/Bus/HOT lane is projected to operate at an acceptable LOS (LOS D or better) in the 2015 Build conditions during the PM peak. In the express lane section, the southbound exit near Boundary Channel improves from LOS F in the 2015 No-Build condition to LOS E in the 2015 No-Build condition in the PM peak. The estimated speed on the express lanes north of the project is 59.1 mph based on the HCS output. There is an improvement in the transition to the HOV lanes south of Eads from LOS E in the 2015 No-Build condition to LOS C in the 2015 Build condition in the PM peak.

Collector Distributor

Similar to the 2015 No-Build, the southbound collector distributor weave near Glebe Road operates at a breakdown in flow during the PM peak in the 2015 Build condition. The southbound collector distributor weave at Dale Boulevard and the northbound collector distributor weave at Prince William Parkway have a reduction in LOS from LOS E in the 2015 No-Build condition to LOS F in the 2015 Build conditions.

PM Peak Hour (2015 Build Conditions) Summary

Similar to the AM peak hour, there is a slight improvement of the traffic operations of the Build condition compared to the No-Build condition in the northbound (peak direction) I-95/I-395 GP lanes during the PM peak hour in the year 2015. This slight improvement is reasonable, as the proposed HOV/Bus/HOT lane improvements will result in additional capacity and better utilization of the HOV/Bus/HOT lane, and have a minor shift in traffic from the northbound I-95/I-395 GP lanes to the HOV/Bus/HOT lane. The I-95/I-395 HOV/Bus/HOT lanes remain at an acceptable LOS, through the use of tolls to manage the demand for the facility. There are a few minor reductions in LOS in the non-peak (northbound) direction, as a result of the Build conditions. When congestion is present, it is anticipated to impact the operation of the adjacent segments.

It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

Several of the connections between the southbound I-95/I-395 GP lanes and the southbound HOV/Bus/HOT lanes, including the transition to the express lanes at Eads Street, exit to the HOV/Bus/HOT lanes north of Edsall Road, and the HOV/Bus/HOT lanes entrance to the southbound I-95 GP lanes north of Joplin Road, show an improvement between the 2015 No-Build and 2015 Build condition. A study is underway to evaluate a potential extension of the HOV/Bus/HOT lane to the south. Although the weave between the HOV/Bus/HOT lane entrance and the Garrisonville Road exit is projected to operate at LOS E, if the HOV/Bus/HOT lane is extended to the south, it is anticipated that this weave movement will improve, as traffic will remain on the HOV/Bus/HOT lane through this segment.

The overall performance of the I-95/I-395 corridor is improved with the proposed HOV/Bus/HOT lane project. The HOV/Bus/HOT lane is projected to remain at an acceptable LOS (LOS D or better) which will enable speeds to be maintained above 45 mph, which will provide buses and other HOV/Bus/HOT lane vehicles the benefits of trip time savings over the GP lanes and travel time reliability.

D. 2030 NO-BUILD ANALYSIS

The 2030 No-Build analysis represents the resulting traffic operations on I-95/I-395 in the design year if the proposed HOV/Bus/HOT lane improvements are not implemented, and the only improvements implemented are those currently programmed. There are several programmed improvements that are included in the 2030 No-Build condition, that were not included in the existing conditions. These programmed improvements include an auxiliary lane on the southbound I-95 GP lanes from Fairfax County Parkway to Gordon Boulevard; an auxiliary lane on northbound I-95 GP lanes from Gordon Boulevard to Lorton Road, modification of the HOV access/egress near Franconia Road, and additional access between the I-495 HOV/Bus/HOT lanes and the I-95 HOV lanes. These improvements are also included in the 2015 No-Build condition, so a direct comparison can be made between the 2015 No-Build and 2030 No-Build segments.

The LOS results for the AM and PM peak hour 2030 No-Build conditions on I-95/I-395 are shown in **Figures VII-5, VII-6** and **VII-7** respectively. The input data that was utilized to determine the 2030 No-Build AM peak hour LOS is shown in **Appendix C Table 7** (basic freeway segments), **Appendix C Table 17** (weave

segments), and **Appendix C Table 27** (ramp junctions), and the input data that was utilized to determine the PM peak hour LOS is shown in **Appendix C Table 8** (basic freeway segments), **Appendix C Table 18** (weave segments), and **Appendix C Table 28** (ramp junctions).

The following sections describe the segments that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) during the 2030 No-Build conditions. All other segments operate at LOS D or higher.

1. AM Peak Hour (2030 No-Build Conditions)

During the morning peak hour, in the northbound (peak) direction, I-95/I-395 generally operates at a LOS C or LOS D with an increase in the number of locations that are projected to operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) as compared to the 2015 No-Build condition.

I-95/I-395 Northbound Basic Freeway Segments

There is a reduction in the LOS between the years 2015 and 2030 of the basic freeway segments on the northbound I-95/I-395 GP lanes, if additional improvements are not implemented. Similar to the 2015 No-Build, the following northbound I-95/I-395 segments will operate at or near capacity (LOS E) during the AM peak period in the year 2030: Prince William Parkway to Gordon Boulevard, Edsall Road to Duke Street, and Seminary Road to King Street, while the basic freeway segments from Joplin Road to the HOV entrance (south of Dumfries Road), Duke Street to Seminary Road, and King Street to Shirlington will continue to have a breakdown in flow (LOS F). In addition, if additional improvements are not implemented, the northbound I-95 basic freeway segment between the HOV entrance (north of Joplin Road) and Dumfries Road will also be at or near capacity (LOS E) in the year 2030 during the AM peak hour.

I-95/I-395 Northbound Weave Segments

The weave segments on the northbound I-95/I-395 GP lanes in the 2015 No-Build and 2030 No-Build are similar. As with the 2015 No-Build condition, the weave segments on the northbound I-95/I-395 GP lanes at the HOV entrance south of Dale Boulevard will have a breakdown in flow (LOS F) in the 2030 condition, while the weave segment from Seminary Road to King Street and Shirlington to Glebe Road will operate at or near capacity (LOS E).

I-95/I-395 Northbound Ramp Junction Segments

The ramp junction segments in the 2030 No-Build condition will operate at a slightly reduced LOS than in the 2015 No-Build condition. Similar to the year 2015, the northbound I-95 GP lane exit to Prince William Parkway will operate at or near capacity (LOS E), while the I-395 GP lane entrance from Duke Street and the I-395 GP lane exit to Seminary Road will have a breakdown in flow (LOS F). In addition, the traffic operations at the Joplin Road entrance ramp to the northbound I-95 GP lanes and the I-95 GP lanes entrance to the HOV lanes south of Dumfries Road are reduced from LOS D to LOS F between the 2015 No-Build and 2030 No-Build conditions.

I-95/I-395 Southbound

Between the year 2015 and 2030, the southbound (non-peak) I-95/I-395 GP lanes continue to experience isolated locations of congestion. Similar to the 2015 No-Build condition, the segments at Boundary Channel Drive operate at or near capacity (LOS E) or with a breakdown in flow (LOS F). In addition, the southbound I-95/I-395 GP lanes between Dale Boulevard and Dumfries Road are projected to operate at or near capacity (LOS E).

I-95/I-395 HOV Lanes

In the peak period during the No-Build conditions, the I-95/I-395 reversible facility is two lanes open to HOVs (three or more occupants), and congested conditions continue in the year 2030, if improvements are not implemented. The HOV lane segment from Shirlington to Washington Boulevard reduces from LOS E in the 2015 No-Build conditions to LOS F in the 2030 No-Build conditions. There continues to be a breakdown in flow at the southbound express lanes exit near Boundary Channel Drive, located north of the project. In addition, the northbound HOV segments from Lorton Road to Franconia Springfield Parkway and from Seminary Road to Shirlington also operate at or near capacity (LOS E). It is important that the HOV lane provide trip time reliability without congestion to encourage usage. Without a tolling component, additional measures may be needed to ensure that the AM peak hour operates at an acceptable LOS during the 2030 No-Build condition.

Collector Distributor Roads

Similar to the 2015 No-Build, in the AM peak hour the northbound collector distributor weaves at Dale Boulevard has a breakdown in flow. In addition, the northbound collector distributor weave at Prince William Parkway will have a breakdown in flow.

AM Peak Hour (2030 No-Build Conditions) Summary

In general, there is a reduction in LOS in the I-95/I-395 northbound GP lanes between the 2015 No-Build conditions and the 2030 No-Build conditions, as a result of the additional traffic demand. In addition to peak direction segments at or near capacity, additional segments on southbound I-95/I-395 GP lanes (non-peak direction) and I-95/I-395 HOV lane operate at LOS E or LOS F. It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

2. PM Peak Hour (2030 No-Build Conditions)

During the evening peak hour, the southbound (peak direction) I-95/I-395 GP lanes generally operates at LOS C and LOS D, however there are also several locations that will operate at or near capacity (LOS E) or have a breakdown in flow (LOS F).

I-95/I-395 Southbound Basic Freeway Segments

In general, there is a reduction in LOS from the 2015 No-Build condition to the 2030 No-Build condition on the southbound I-95/I-395 basic freeway segments in the PM peak. Similar to the 2015 No-Build conditions, the basic freeway segments on southbound I-95/I-395 GP lanes from Duke Street to Edsall, Gordon Boulevard to Prince William Parkway and Dale Boulevard to Dumfries Road will operate at or near capacity (LOS E) in the 2030 No-Build condition. In addition, basic freeway segment on southbound I-95 between Prince William Parkway and Opitz Boulevard, Dumfries Road to Joplin Road and Russell Road to Garrisonville Road will operate at or near capacity (LOS E). In addition, the basic freeway segment on southbound I-95 between Joplin Road and Russell Road will reduce from LOS E in the 2015 No-Build condition to LOS F in the 2030 No-Build condition.

I-95/I-395 Southbound Weave Segments

Similar to the 2015 No-Build conditions, in the PM peak hour, the weave segments on the southbound I-395 GP lanes at Boundary Channel will have a breakdown in flow and the weave at Duke Street operate at or near capacity (LOS E) in the 2030 No-Build condition.

I-95/I-395 Southbound Ramp Junction Segments

Similar to the 2015 No-Build conditions, the I-395 GP lane exit to Jefferson Davis Highway will operate at LOS E, and the HOV exit (south of Duke Street), the Lorton entrance to southbound I-95, and the HOV entrance (south of Dumfries Road) to southbound I-95 will operate at or near capacity in the year 2030 PM peak hour. In addition, the Gordon Boulevard entrance to southbound I-95 GP lanes and the I-95 southbound GP lanes exit to Prince William Parkway will operate at or near capacity (LOS E) during the PM peak hour in the year 2030. Therefore, there is a reduction in the operation of the southbound I-95/I-395 ramp junction segments between the 2015 and 2030 No-Build condition in the PM peak.

I-95/I-395 Northbound Segments

From the 2015 No-Build condition to the 2030 No-Build condition, there is an increase in the congestion in the non-peak (northbound) direction in the PM peak period. Similar to the 2015 No-Build conditions, the basic freeway segments from Edsall Road to Seminary Road will continue to operate at or near capacity (LOS E). The basic freeway segment between Joplin Road and Dumfries Road will decrease in operations from LOS E in the 2015 No-Build condition to LOS F in the 2030 No-Build condition during the PM peak. In addition, several northbound I-95/I-395 ramps will operate at or near capacity by the year 2030 in the PM peak, including the Dumfries Road exit, the Prince William Parkway exit, and the Seminary Road exit.

I-95/I-395 HOV Lanes

Between the 2015 No-Build and 2030 No-Build conditions, the segment of the I-95 HOV lane from Route 1 to Fairfax County Parkway will operate at or near capacity (LOS E) if improvements are not implemented. Similar to the 2015 No-Build condition, the southbound express lane exit near Boundary Channel will continue to have a breakdown in flow (LOS F) and the transition to the HOV lane south of Eads Street will continue to operate at or near capacity (LOS E). Therefore, the operations of the HOV lane will need to monitored or additional improvements made in the segments identified above to ensure that the HOV lane continues to provide trip time reliability and travel time savings to motorists, including buses.

Collector Distributor Roads

During the PM peak hour, the weave at the Dale Boulevard on the southbound collector distributor road and the weave at Prince William Parkway on the northbound collector distributor road will deteriorate from at or near capacity (LOS E) in the 2015 No-Build condition to a breakdown in flow (LOS F) in the 2030 No-Build condition. In addition, the weave on the southbound collector distributor road near Glebe Road will remain at LOS F in the 2030 No-Build condition.

PM Peak Hour (2030 No-Build) Summary

There is a general reduction in LOS on the southbound I-95/I-395 GP lanes during the PM peak between the 2015 No-Build and 2030 No-Build conditions. There is also a reduction in the LOS on the northbound (off-peak) I-95/I-395 GP lanes during the PM peak hour during this same time frame. In addition, by the year 2030, conditions in a portion of the HOV lane will become at or near capacity, if improvements are not implemented. It is important that the HOV lane have trip time reliability and travel time savings in order to encourage usage. It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

E. 2030 BUILD ANALYSIS

The 2030 Build condition represents the design year of the proposed improvements. Specific components of the Build Alternative include a widening of the reversible facility from two-lanes to three lanes, conversion of the reversible HOV lane to reversible HOV/Bus/HOT lane, and ramp changes to better accommodate the proposed improvements.

A complete description of the Build Alternative is located in **Section IV.B. Build Alternative**.

The LOS results for the AM and PM peak hour 2030 Build conditions on I-95/I-395 are shown in **Figures VII-5, VII-6** and **VII-7** respectively. The input data that was utilized to determine the 2030 Build AM peak hour LOS is shown in **Appendix C Table 9** (basic freeway segments), **Appendix C Table 19** (weave segments), and **Appendix C Table 29** (ramp junctions), and the input data that was utilized to determine the PM peak hour LOS is shown in **Appendix C Table 10** (basic freeway segments), **Appendix C Table 19** (weave segments), and **Appendix C Table 29** (ramp junctions).

The traffic analysis is based on the proposed I-95/I-395 corridor improvements as of December 2008. As the design changes as a result of the project development process, it is important that the traffic operations be evaluated to determine the operations results as a result of the changes. Since the traffic analysis was completed, the shoulders on the HOV/Bus/HOT lane were reversed on select horizontal curves to improve stopping sight distance. This is not reflected in the traffic analysis, because it was determined that this change will have a minimal impact on the results.

The following sections describe the segments that operate at or near capacity (LOS E) or have a breakdown in flow (LOS F) during the 2015 Build conditions. All other segments operate at LOS D or higher.

1. AM Peak Hour (2030 Build Conditions)

Similar to the 2030 No-Build condition in the morning peak hour, northbound (peak direction), I-95/I-395 generally operates at a LOS C or LOS D with several locations that are projected to operate at or near capacity (LOS E) or have a breakdown in flow (LOS F).

I-95/I-395 Northbound Basic Freeway Segments

The northbound I-95/I-395 basic freeway segments operate slightly better in the 2030 Build condition than the 2030 No-Build condition. The basic freeway segment from the entrance to the HOV lane (north of Joplin Road) to Dumfries Road, Prince William Parkway to Gordon Boulevard, and one of the basic freeway segments from Seminary Road to King Street (near King Street) improves from LOS E in the 2030 No-Build condition to LOS D in the 2030 Build condition. The basic freeway segment between King Street and Shirlington (near King Street) improves from LOS F in the 2030 No-Build condition to LOS E in the 2030 Build condition. Similarly, the basic freeway segment between Edsall Road and Duke Street improves from LOS E in the 2030 No-Build condition to LOS C/LOS D (weave) in the 2030 Build condition. Although the basic freeway segments between Seminary Road and King Street (near Seminary Road) will remain at LOS E in both the 2030 No-Build and Build conditions, there is an improvement in operations (2030 No-Build: density 42.1 pcpmpl to 2030 Build: density 37.0 pcpmpl) in the AM peak. The basic freeway segment from Joplin Road to the entrance to the HOT/Bus/HOV lane (south of Dumfries Road) and Duke Street to Seminary Road will remain at LOS F in both the 2030 No-Build and Build conditions in the AM peak.

I-95/I-395 Northbound Weave Segments

There is a slight improvement in the northbound I-95/I-395 weave segments between the 2030 No-Build to the 2030 Build conditions in the AM peak. The northbound weave segment between Shirlington and Glebe Road improves from LOS E in the 2030 No-Build condition to LOS D in the 2030 Build condition. Although the weave at the entrance to the HOV/Bus/HOT lanes south of Dale Boulevard has a breakdown in flow in both the 2030 No-Build and Build conditions, there is an improvement in the weave from the 2030 No-Build condition (density: 56.4 pcpmpl) to the 2030 Build condition (52.2 pcpmpl). Similarly, the weave segment between Seminary Road and King Street has a slight improvement from the 2030 No-Build condition (LOS E: density 40.7 pcpmpl) to the 2030 Build condition (LOS E: 36.5 pcpmpl).

I-95/I-395 Northbound Ramp Junction Segments

The ramp junction segments in the 2030 Build condition will operate similar to the 2030 No-Build conditions during the AM peak hour. The Prince William Parkway exit improves from LOS E in the 2030 No-Build condition to LOS D in the 2030 Build condition. In addition, the Duke entrance improves from LOS F in the 2030 No-Build condition to LOS E in the 2030 Build condition during the AM peak hour. Although the exit to Seminary remains at LOS F in both the Build and No-Build condition, there is an improvement from the 2030 No-Build (density: 39.0 pcpmpl) to the 2030 Build condition (density: 36.3 pcpmpl).

However, there is a slight reduction in traffic operations at a few of the ramp junctions between the 2030 No-Build and Build conditions. Although the Joplin entrance remains at LOS F, the density increases from 36.0 pcpmpl in the 2030 No-Build condition to 42.4 pcpmpl in the 2030 Build condition. Similarly, the exit to the HOV/Bus/HOT lanes south of Dumfries Road remains at LOS F, but with an increase in density from 39.2 pcpmpl in the 2030 No-Build condition to 46.8 pcpmpl in the 2030 Build condition. In addition, the exit to the HOV/Bus/HOT lane located North of Lorton Road will operate at LOS E in the 2030 Build condition, a reduction from LOS D in the 2030 No-Build condition.

I-95/I-395 Southbound

Similar to the 2030 No-Build condition, the southbound I-395 (off-peak) segments near Boundary Channel will operate at or near capacity (LOS E) or with a breakdown in flow. On the southbound I-95/I-395 GP lanes between Dale Boulevard and Dumfries Road, a section of the basic freeway segment that operated at or near capacity (LOS E) in the 2030 No-Build condition, and improves to LOS D in the 2030 Build condition during the AM peak hour.

I-95/I-395 HOV/Bus/HOT Lanes

There is a substantial improvement in the operation of the HOV/Bus/HOT lane as a result of the Build conditions. The segment of the HOV/Bus/HOT lane between Shirlington and Washington Boulevard improves from LOS F in the 2030 No-Build condition to LOS D in the 2030 Build condition. Similarly, the HOV/Bus/HOT lane between Seminary Road and Shirlington improves from LOS E in the 2030 No-Build condition to LOS D in the 2030 Build condition. Both the 2030 No-Build and Build conditions have a segment at or near capacity between Lorton Road and Fairfax County Parkway. This segment slightly improves from the 2030 No-Build condition (LOS E: density 41.1 pcpmpl) to the 2030 Build condition (LOS E: density 35.5 pcpmpl). The HCS output indicates that the speed on this segment will be 59.4 mph, which exceeds SAFETEA-LU guidelines for HOV/Bus/HOT lanes. In addition, the HOV/Bus/HOT lane exit to Franconia Springfield Parkway reduces from LOS D in the 2030 No-Build condition to LOS F in the 2030 Build condition, which is a result of the high demand (2,360 passenger cars per hour per lane (pcphpl)) which exceeds the capacity of a one-lane ramp. This also causes the merge segment upstream from this

segment to operate at or near capacity (LOS E). The HCS output indicates that the speed on this segment will be approximately 34.1 mph, which is the less than the SAFETEA-LU guidelines for HOV/Bus/HOT lanes. If there becomes an operational concern at this location, the toll can be increased to reduce the demand so that acceptable operations result.

Similar to the 2030 No-Build conditions during the AM peak, the southbound express lanes at the exit near Boundary Channel has a breakdown in flow (LOS F). Due to a small increase in traffic projections between the 2030 No-Build (3,560 vph) and the 2030 Build (4,050 vph), the northbound express lanes north of Eads Street will operate at or near capacity (LOS E).

Collector Distributor Roads
As with the 2030 No-Build condition, there continues to be a breakdown in flow at the collector distributor weave at Dale Boulevard (Northbound) and Prince William Parkway (northbound).

AM Peak Hour (2030 Build) Summary
In general, there is a slight improvement in traffic operations by comparing the 2030 No-Build condition with the 2030 Build condition. This improvement is a result of the ability to manage the demand in the HOV/Bus/HOT lane and the additional capacity on the HOV/Bus/HOT lane. It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

The majority of the connections between the GP lanes and the HOV/Bus/HOT lane operate at an acceptable LOS (LOS D or better) or an improvement over the No-Build conditions. The entrance to the HOV/Bus/HOT lane at the southern terminus of the project is projected to operate at LOS F, as a result of volume exceeding capacity in the GP lanes and a high exit ramp demand (2,040 vph) during the 2030 AM peak Build condition. There is currently a study underway to extend the project to the south. It is anticipated that a future southern extension will reduce the demand on the northbound GP lanes and entrance to the HOV/Bus/HOT lane (south of Dumfries Road). It is anticipated that the HOV/Bus/HOT lane basic segment at Franconia Springfield will operate at or near capacity, but still exceeds SAFETEA-LU guidelines for HOV/Bus/HOT lanes. This will provide trip time reliability for buses and other vehicles utilizing the HOV/Bus/HOT lanes. In addition, the traffic demand for the I-95/I-395 HOV/Bus/HOT lanes can be managed in real time by adjusting the toll, so that they operate at an acceptable LOS.

2. PM Peak Hour (2030 Build Conditions)
During the evening peak hour, the I-95/I-395 corridor generally operates at LOS C and LOS D with several locations that will operate at or near capacity (LOS E).

I-95/I-395 Southbound Basic Freeway Segments
By comparing the 2030 No-Build and 2030 Build conditions, there is an improvement in the 2030 Build condition as compared to the 2030 No-Build condition. The southbound basic freeway segment from Duke Street to Edsall Road, Dale Boulevard to Dumfries and Russell Road to Garrisonville Road improves from a LOS E in the 2030 No-Build condition to LOS D in the 2030 Build condition during the PM peak. In addition, the southbound basic freeway segment between Joplin Road and Russell Road improves from LOS F in the 2030 No-Build condition to LOS D in the 2030 Build condition as a result of the proposed improvements. Similarly, the basic freeway segment between Dumfries Road and Joplin Road improves from

a LOS E in the 2030 No-Build condition to a LOS C (weave section) in the 2030 Build condition, as a result of a geometry change. Although the LOS on the southbound I-95 GP lanes between Gordon Boulevard and Prince William Parkway remains at or near capacity (LOS E) in both the 2030 Build and No-Build condition, the traffic operations improves from a density of 40.6 pcpmpl (2030 No-Build) to a density of 39.2 pcpmpl (2030 Build). Similarly, the southbound I-95 basic freeway segment between Prince William Parkway and Opitz Boulevard has a slight improvement from the 2030 No-Build (LOS E: density 36.9 pcpmpl) to the 2030 Build (LOS E: density 36.7 pcpmpl).

I-95/I-395 Southbound Weave Segments

Similarly, the I-95/I-395 weave segments in the 2030 Build condition operate slightly better than the 2030 No-Build conditions. Although the weave segment at Duke Street operates at LOS E in both the 2030 Build and No-Build conditions, there is an improvement in density from 42.2 pcpmpl (2030 No-Build) to 37.3 pcpmpl (2030 Build). There is a similar reduction in density at the weave segment at Boundary Channel, although the weave will operate at LOS F in both the 2030 Build and 2030 No-Build condition. As a result of the proposed ramping changes, the weave between the HOV/Bus/HOT lane entrance (south of Russell Road) and the Garrisonville exit will operate at LOS F in the 2030 Build condition. As previously mentioned, there is a study underway to extend the HOV/Bus/HOT lanes to the south. If the extension of the HOV/Bus/HOT lanes is recommended as part of the study, it is anticipated that the weave north of Garrisonville Road will improve as a result of a shift in traffic from the GP lanes to the HOV/Bus/HOT lane.

I-95/I-395 Southbound Merge/Diverge Segments

The southbound I-95/I-395 merge/diverge segments operate better in the 2030 Build condition than in the 2030 No-Build condition. The I-395 southbound exit to the HOV/Bus/HOT lanes (south of Duke Street), Lorton entrance ramp, and the exit to Prince William Parkway improves from LOS E in the No-Build condition to LOS D in the No-Build condition. The I-395 GP lane exit to Jefferson Davis Highway remains at LOS E in both the 2030 Build and No-Build condition in the PM peak. As a result of the proposed ramping modifications, the HOV/Bus/HOT lane entrance to the southbound I-95 GP lanes (south of Dumfries Road) improves from LOS E in the 2030 No-Build condition to LOS C (weave segment) in the 2030 Build condition. However, there is a slight reduction in traffic operates in the eastbound Gordon entrance from the 2030 No-Build (LOS E: density 35.9 pcpmpl) to the 2030 Build (LOS E: density 36.7 pcpmpl).

I-95/I-395 Northbound Segments

There are a few minor reductions in the operation of the northbound I-95/I-395 segments between the 2030 No-Build and 2030 Build condition. There is No change in the basic freeway segment between Joplin Road and Dumfries Road in the 2030 Build and No-Build conditions. However, there is a slight reduction in traffic operations in the basic segment between Edsall Road and Duke Street between the 2030 No-Build (LOS E: density 36.7 pcpmpl) and the 2030 Build (LOS E: density 39.0 pcpmpl) and in the basic freeway segment between Duke Street and Seminary Road between the 2030 No-Build (LOS E: 41.1 pcpmpl) and the 2030 Build (LOS E: 44.0 pcpmpl). In addition, the exit to eastbound Dumfries Road has a slight reduction in traffic operations from the 2030 No-Build (LOS E: density 35.5 pcpmpl) to the 2030 Build (LOS E: density 35.8 pcpmpl). There is also a similar slight reduction in traffic operations from the 2030 No-Build to the 2030 Build at the Prince William Parkway exit and the exit to Seminary Road. In addition, the Duke entrance to northbound I-395 is reduced from LOS D (density 34.3 pcpmpl) in the 2030 No-Build condition to LOS E (density 35.2 pcpmpl) in the 2030 Build condition. These minor reductions in operations in the Northbound (off-peak direction) are outweighed by the significant improvements in the peak direction during the PM peak

I-95/I-395 HOV/Bus/HOT Lanes

There is a general improvement in the I-95/I-395 reversible facility from the 2030 No-Build condition to the 2030 Build condition. The I-95/I-395 HOV/Bus/HOT lane segment from Fairfax County Parkway to Route 1 that operated at or near capacity (LOS E) during the PM peak hour in the 2030 No-Build condition improved to LOS C/LOS D in the 2030 Build condition. Due to the change in ramping south of Route 1 Interchange, the operations of the HOV/Bus/HOT lane reduced from LOS D to LOS E from the 2030 No-Build to 2030 Build condition. Based on the HCS output, the speed for this segment is estimated at 50.9 mph, which exceeds SAFETEA-LU guidelines for HOV/Bus/HOT lanes.

The transition of the express lanes to the HOV/Bus/HOV lanes near Eads improved from LOS E in the 2030 No-Build condition to LOS C in the 2030 Build condition. From the 2030 No-Build to 2030 Build comparison, there is an improvement in the operation of the southbound express lane exit near Boundary Channel from LOS F to LOS E. The basic segment located north of this exit ramp has reduced from LOS D (density 34.6 pcpmpl) in the 2030 No-Build condition to LOS E (density 36.6 pcpmpl) in the 2030 Build condition. Based on the HCS output, the speed on this segment in the 2030 Build condition is 58.4 mph, which exceeds SAFETEA-LU guidelines for HOV/Bus/HOT lanes.

The demand in the segments identified above will need to be monitored, so that the toll can be adjusted to ensure that the HOV/Bus/HOT lane continues to provide trip time reliability and travel time savings to motorists.

Collector Distributor Roads

As with the 2030 No-Build conditions, the southbound Dale Boulevard weave, Northbound Prince William Parkway weave, and southbound weave near Glebe Road on the collector distributor road operates at LOS F in the PM peak.

PM Peak Hour (2030 Build) Summary

In general, there is a slight improvement in traffic operations in the I-95/I-395 GP lanes (peak direction) and the reversible facility by comparing the 2030 No-Build condition with the 2030 Build condition. This improvement is a result of the ability to manage the demand in the HOV/Bus/HOT lane and the additional capacity on the HOV/Bus/HOT lane provided in the Build conditions. It is anticipated that the congestion from the isolated segments identified above may negatively impact the traffic operations on the adjacent segments; therefore, the congestion may be experienced in the segments upstream from those identified above.

The connections between the proposed HOV/Bus/HOT lanes and the GP lanes generally operate as well or better in the 2030 Build condition than the 2030 No-Build conditions. The connections south of Dumfries Road, south of Dale Boulevard, and south of Duke Street which operated at or near capacity (LOS E) in the 2030 No-Build condition will operate at LOS D or better in the 2030 Build condition. Although the proposed changes will result in LOS F in the weave segment north of Garrisonville Road, there is currently a study underway at this location to extend the HOV/Bus/HOT to the south which is anticipated to improve the operations of this segment.

Based on the HCS output, the HOV/Bus/HOT lane will have an operating speed greater than 45 mph in the 2030 Build condition in the PM peak. This will provide buses and other vehicles on the HOV/Bus/HOT lane trip time reliability and travel time savings.

F. NO-BUILD VERSUS BUILD COMPARISON SUMMARY

Using the methodology that was described earlier in this chapter, based on substantial changes in density or flowrate, the comparison of the 2015 Build and No-Build traffic operations and the 2030 Build and No-Build traffic operations is shown in **Figures VII-8 and VII-9**. The criteria for defining a substantial change in density/delay was based on the percentage difference in density/delay between adjacent LOS letter ratings in the HCM. For the basic freeway segments (LOS A-LOS E), ramp junctions and weave segments, 20 percent was conservatively chosen to represent a substantial change in operations, as it is on the lower end of the percent change in densities for LOS as defined in the HCM. HCM does not report densities for segments that have a breakdown in flow (LOS F); therefore, flow rate was utilized to identify segments with substantial operational changes. For the basic freeway segments (LOS F), 10 percent was conservatively chosen to represents a substantial change in operations, as it is on the lower end of the percent change in flow rates for LOS as defined in the HCM.

THE BUILD CONDITION IS BETTER THAN THE NO-BUILD CONDITION FOR BOTH 2015 AND 2030.

The results indicate that Build condition creates an overall slight improvement in the traffic operations in the I-95/I-395 corridor without creating any system-wide negative impacts or degrading system operations. Evaluating the comparison of the No-Build and Build condition in the year 2015 during the AM and PM peak hour, indicates that the most positive operational improvement based on the HCS analysis occurs immediately south of the I-495 interchange (Section 2C with 26 percent of the links with a substantial positive improvement) and at the northern terminus of the project (Section 3F with 18 percent of the links with a substantial negative improvement). Similarly, by comparing the No-Build and Build condition in the year 2030 during the AM and PM peak, the most positive operational improvement based on the HCS analysis occurs at the northern terminus of the project (Section 3F with 19 percent of the links with a substantial positively improvement) and at the southern terminus of the project (Section 1A with 18 percent of the links with a substantial positive improvement).

A screenline analysis was conducted to compare the vehicle throughput in the 2015 No-Build and Build conditions. The results also indicate that the 2030 Build condition carries between four percent and 12 percent more traffic than the 2030 No-Build condition during the AM peak hour and between one percent and 14 percent additional traffic in the PM peak hour. A similar trend can be observed from the comparison of the 2015 No-Build and Build conditions. The largest percent increase in traffic is observed in the middle of the corridor and the smallest increase in percent traffic is observed at the termini of the proposed project, particularly the Northern termini. Therefore, the Build Alternative results in better use of the I-95/I-395 corridor, by accommodating more traffic at slightly improved traffic operations than the No-Build condition.

G. INTERSECTION ANALYSIS

The intersection analysis evaluated the interchanges with I-95 and I-395, including the HOV/Bus/HOT lanes for a total of 71 intersections in the existing and No-Build condition, and 75 intersections for the Build condition. A summary of the existing and 2015 AM and PM peak hour that are projected to operate at LOS E or LOS F is shown in the following table.

Summary of the Intersections with a LOS of E or F for the Existing and 2015 No-Build Conditions

ID	Crossroad Interchange	Cross Street	AM Peak Hour				PM Peak Hour			
			Existing		2015 No-Build		Existing		2015 No-Build	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
310	Garrisonville Road	Salisbury Drive and Stafford Market Place	*	*	*	*	*	*	84.9	F
311	Garrisonville Road	Jefferson Davis Hwy, and Washington Drive	56	E	63.3	E	*	*	100.7	F
4	Russell Road	I-95 SB On-Ramp/Off-Ramp	*	*	285.5	F	>1000	F	>1000	F
314	Russell Road	I-95 NB Off-Ramp	70.8	F	490.1	F	*	*	>1000	F
316	Joplin Road	I-95 NB On-Ramp/Off-Ramp	*	*	38.1	E	*	*	54.3	F
317	Joplin Road	Jefferson Davis Hwy, and Fuller Road	*	*	*	*	*	*	55.8	E
319	Dumfries Road	Old Stage Coach Road, Jefferson Davis Highway and North Fraley Boulevard	*	*	*	*	68.9	E	118.5	F
321	Dale Boulevard	Gideon Drive	74.9	E	146.7	F	66.7	E	103.3	F
329	Gordon Boulevard	Old Bridge Road	*	*	57.6	E	70.3	E	72	E
370	Gordon Boulevard	Horner Road	*	*	61.4	E	*	*	*	*
337	Fairfax County Parkway	Backlick and Fullerton Road	*	*	99.9	F	*	*	*	*
68	Fairfax County Parkway	Fullerton Road	*	*	*	*	70.5	E	*	*
195	Fairfax County Parkway	I-95 northbound off-ramp and Newington Road	*	*	281.6	F	81.9	F	154	F
339	Fairfax County Parkway	Terminal Road	*	*	148.3	F	*	*	*	*
278	Franconia-Springfield Parkway	I-95 HOV/Bus/HOT on-ramp/off-ramp	*	*	255	F	*	*	132	F
283	Franconia Road	Backlick Road	*	*	109.5	F	*	*	*	*
343	Duke Street	Beauregard Street	69.3	E	86	F	65.3	E	88.9	F
102	Seminary Road	Mark Center Drive	*	*	59	E	*	*	*	*
381	Westbound Seminary Rd	I-395 HOV Ramp	*	*	*	*	*	*	77.6	E
384	Shirlington Rotary	Arlington Mill	37.7	E	101.6	F	214.6	F	>1000	F
385	Shirlington Rotary	Quaker Lane	112.3	F	200.4	F	61.3	F	119	F
114	South Glebe Road	24th Road	*	*	*	*	*	*	65	E
357	South Glebe Road	South Four Mile Run Drive and West Glebe Road	*	*	66.7	E	*	*	*	*
362	Eads Street	North Rotary Road	*	*	39.4	E	*	*	37.9	E
361	Eads Street	South Rotary Road	61.6	F	92.4	F	36.7	E	*	*
359	Eads Street	I-395 northbound off-ramp/on-ramp	>1000	F	>1000	F	>1000	F	521.4	F
360	Eads Street	I-395 southbound on-ramp/off-ramp	37.1	E	478.2	F	*	*	*	*
358	Eads Street	Army Navy Drive	*	*	73.1	E	*	*	*	*

*HCS results indicate LOS D or better.

1. Existing Conditions - Intersections

The existing conditions LOS and delay from the HCS analysis are graphically illustrated in **Figures VII-1 and VII-2**, respectively.

AM Peak Hour
The HCS results indicate LOS D or better for the majority of the intersections (62 of the 71 intersections). In the existing AM peak, there are five intersections that operate at LOS E and four intersections that operate at LOS F.

PM Peak Hour
The HCS results indicate LOS D or better for the majority of the intersections (60 of the 71 intersections). In the existing PM peak, there are six intersections that operate at LOS E and five intersections that operate at LOS F.

Existing Conditions – Intersections –Summary
The existing conditions intersection analysis indicates that the majority of the intersections along the I-95/I-395 corridor operate at an acceptable LOS (LOS D or better).

2. 2015 No-Build Conditions - Intersections
The HCS results of the AM and PM peak hour 2015 No-Build conditions intersection analysis for I-95/I-395 during the 2015 No-Build conditions are summarized in **Appendix C Tables 31 and 33**. The 2015 No-Build conditions LOS and delay from the HCS analysis are graphically illustrated in **Figures VII-3 and VII-4**, respectively.

The intersections that will operate at LOS E or LOS F during the 2015 no build condition (AM or PM peak hour) are identified in the previous table.

AM Peak Hour
The HCS results indicate LOS D or better for the majority of the intersections (49 of the 71 intersections) during the 2015 No-Build condition in the AM peak hour. During the AM peak in the year 2015, it is projected that eight intersections will operate at LOS E and 14 intersections will operate at LOS F, for a total of 22 intersections operating worse than LOS D. Overall, there is a general reduction in LOS at the intersections between the existing conditions and the 2015 No-Build conditions in the AM peak. Between the years 2008 and 2015 (No-Build), seven additional intersections become at or near capacity (LOS E), six additional intersections will have a breakdown in flow (LOS F), while three intersections have a reduction in traffic operations from LOS E to LOS F, and five intersections remain at the same LOS (LOS E or LOS F) with each of these intersections showing an equivalent or increase in delay. However, one intersection will no longer operate at LOS E or LOS F in the 2015 No-Build condition that operated at LOS E or LOS F in the existing conditions during the AM peak hour.

PM Peak
The HCS results for the 2015 No-Build condition for the PM peak indicate LOS D or better for the majority of the intersections (53 of the 71 intersections. There is a general reduction in traffic operations in the PM peak hour from the existing conditions to the 2015 No-Build condition with 11 intersections operating at LOS E or LOS F in the existing conditions and 18 intersections operating at LOS E or LOS F in the 2015 No-Build conditions. Comparing the PM peak in the existing and No-Build conditions, there are four additional intersections that operate at or near capacity (LOS E), five additional intersections that operate in turbulent flow (LOS F), three intersections that are reduced from LOS E to LOS F, and six that remain at the same LOS (LOS E or LOS F) with four intersections having an increase in delay, one intersection having a decrease in delay and one intersection having no change in delay. However, two intersections will no longer operate at

LOS E or LOS F in the 2015 No-Build condition that operated at LOS E or LOS F in the existing conditions during the PM peak hour.

2015 No-Build Conditions – Intersections –Summary
Based on the HCS analysis of the signalized intersections in the I-95/I-395 corridor, there is a general reduction in traffic operations in both the AM peak hour and PM peak hour from the existing conditions to the 2015 No-Build condition for those intersections.

3. 2015 Build Conditions - Intersections
The HCS results of the AM and PM peak hour 2015 Build conditions intersection analysis for I-95/I-395 are summarized in **Appendix C Tables 31 and 33**. The 2015 Build conditions LOS and delay from the HCS analysis are graphically illustrated in **Figures VII-3 and VII-4**, respectively.

The table below shows the intersections with a LOS of E or F for the 2015 Build Conditions for either the AM or PM Peak hour:

Summary of the Intersections with a LOS of E or F for the 2015 Build Conditions

ID	Crossroad Interchange	Cross Street	AM		PM	
			2015 Build		2015 Build	
			Delay	LOS	Delay	LOS
310	Garrisonville Road	Salisbury Drive and Stafford Market Place	*	*	96.9	F
311	Garrisonville Road	Jefferson Davis Hwy, and Washington Drive	64.5	E	100.2	F
4	Russell Road	I-95 SB On-Ramp/Off-Ramp	285.5	F	>1000	F
314	Russell Road	I-95 NB Off-Ramp	490.1	F	>1000	F
316	Joplin Road	I-95 NB On-Ramp/Off-Ramp	39.6	E	69.3	F
317	Joplin Road	Jefferson Davis Hwy, and Fuller Road	*	*	59.2	E
319	Dumfries Road	Old Stage Coach Road, Jefferson Davis Highway and North Fraley Boulevard	*	*	128.8	F
321	Dale Boulevard	Gideon Drive	146.2	F	110.2	F
329	Gordon Boulevard	Old Bridge Road	*	*	71.8	E
195	Fairfax County Parkway	I-95 northbound off-ramp and Newington Road	280.7	F	154	F
339	Fairfax County Parkway	Terminal Road	147.8	F	*	*
278	Franconia-Springfield Parkway	I-95 HOV/Bus/HOT on-ramp/off-ramp	56	E	*	*
283	Franconia Road	Backlick Road	113.3	F	*	*
343	Duke Street	Beauregard Street	64.7	E	65.9	E
102	Seminary Road	Mark Center Drive	61	E	*	*
383	Shirlington Rotary	I-395 northbound off-ramp/I-395 HOV/Bus/HOT Ramp (PM)	*	*	60.2	E
114	South Glebe Road	24th Road	*	*	66.1	E

*HCS results indicate LOS D or better.

AM Peak Hour
The HCS results indicate LOS D or better for the majority of the intersections (64 of the 75 intersections) in the I-95/I-395 corridor in the 2015 Build condition in the AM peak hour. In general, the 2015 Build conditions operates at a better LOS as compared to the 2015 No-Build condition in the AM peak hour. Four of the intersections that operated at LOS E in the 2015 No-Build condition in the AM peak, operate at LOS D

or better in the 2015 Build condition. Similarly, seven of the intersections that operated at LOS F in the 2015 No-build condition in the AM peak, operate at LOS D or better in the 2015 Build condition. Two intersections improved from LOS F (2015 No-Build) to LOS E (2015 Build). Nine intersections remained at the same LOS in both the 2015 No-Build and 2015 Build condition, with three of the intersections having a higher delay in the 2015 No-Build condition, four of the intersections having a higher delay in the 2015 Build condition, and two of the intersections with no change in delay between the 2015 No-Build and Build condition.

PM Peak

The HCS **results indicate** LOS D **or better for the majority of the intersections (62 of the 75 intersections) in the 2015 build condition in the** PM **peak hour.** In general, the 2015 Build condition operates at a slightly improved operations than the 2015 No-Build condition in the PM peak hour. Two intersections that operated at LOS E in the 2015 No-Build condition will operate at LOS D or better in the 2015 Build condition. Similarly, four intersections that operated at LOS F in the 2015 No-build condition will operate at LOS D or better in the 2015 Build condition. One intersection improved from LOS F in the 2015 No-Build condition to the LOS E in the 2015 Build condition. Ten intersections remained at the same LOS (LOS E or LOS F) in both the 2015 No-Build and Build condition during the PM peak hour, with three intersections having no change in delay, two intersections having a decrease in delay, and six intersections having an increase in delay.

2015 Build Condition – Intersections –Summary

Based on the HCS analysis of the signalized intersections in the I-95/I-395 corridor, there is a slight improvement in traffic operations in both the AM peak hour and PM peak hour from the 2015 No-Build condition to 2015 Build condition.

4. 2030 No-Build Conditions - Intersections

The HCS results of the AM and PM peak hour 2030 No-Build conditions for I-95/I-395 intersections are summarized in **Appendix C Tables 31 and 33**. The results of the AM and PM peak hour 2030 No-Build conditions LOS and delay from the HCS analysis are graphically illustrated in **Figures VII-5 and VII-6**, respectively.

The table below shows the intersections with a LOS of E or F for the 2030 No-Build Conditions for either the AM or PM Peak hour:

Summary of the Intersections with a LOS of E or F for the 2030 No-Build Conditions

ID	Crossroad Interchange	Cross Street	AM		PM	
			2030 No-Build		2030 No-Build	
			Delay	LOS	Delay	LOS
310	Garrisonville Road	Salisbury Drive and Stafford Market Place	72.8	E	89	F
311	Garrisonville Road	Jefferson Davis Hwy, and Washington Drive	82.1	F	180.5	F
4	Russell Road	I-95 SB On-Ramp/Off-Ramp	826.9	F	>1000	F
314	Russell Road	I-95 NB Off-Ramp	>1000	F	>1000	F
316	Joplin Road	I-95 NB On-Ramp/Off-Ramp	59.1	F	75.8	F
317	Joplin Road	Jefferson Davis Hwy, and Fuller Road	63.5	E	68	E
319	Dumfries Road	Old Stage Coach Road, Jefferson Davis Highway and North Fraley Boulevard	*	*	213.2	F

321	Dale Boulevard	Gideon Drive	181.7	F	139.1	F
326	Prince William Parkway	I-95 SB on-ramp and Homer Road Park and Ride	*	*	63.7	E
329	Gordon Boulevard	Old Bridge Road	71.2	E	73.5	E
370	Gordon Boulevard	Horner Road	89.9	F	*	*
59	Lorton Road	I-95 SBOn-ramp/Off-ramp	*	*	64.4	E
335	Fairfax County Parkway	Boudinot Drive and Fullerton Road	73.7	E	*	*
195	Fairfax County Parkway	I-95 northbound off-ramp and Newington Road	276	F	172.2	F
339	Fairfax County Parkway	Terminal Road	149.4	F	74.4	E
278	Franconia-Springfield Parkway	I-95 HOV/Bus/HOT on-ramp/off-ramp	297	F	180	F
283	Franconia Road	Backlick Road	132.9	F	*	*
343	Duke Street	Beauregard Street	107.7	F	88.5	F
102	Seminary Road	Mark Center Drive	64	E	*	*
381	Westbound Seminary Road	I-395 HOV Ramp	*	*	77.1	E
384	Shirlington Rotary	Arlington Mill	168.7	F	>1000	F
385	Shirlington Rotary	Quaker Lane	220.1	F	128.5	F
114	South Glebe Road	24th Road	*	*	107.9	F
357	South Glebe Road	South Four Mile Run Drive and West Glebe Road	80.1	F	*	*
362	Eads Street	N Rotary Road	55.9	F	*	*
361	Eads Street	S Rotary Road	124.8	F	76.2	F
360	Eads Street	I-395 SB On-Ramp/Off-Ramp	838.9	F	*	*
359	Eads Street	I-395 northbound off-ramp/on-ramp	>1000	F	579.9	F

*HCS results indicate LOS D or better.

AM Peak

The HCS results indicate LOS D or better for the majority of the intersections (50 of the 71 intersections) during the 2030 No-Build AM peak hour. Due to the projected growth in the corridor between the year 2015 and the year 2030, there is a decrease in the LOS in the signalized intersections. Five of the intersections reduced from LOS E to LOS F, three of the intersections became at or near capacity (LOS E), and fifteen intersections remained at the same LOS (13 with an increase in delay, one with a decrease in delay, and one with no change in delay) between the year 2015 and 2030. However, two intersections will no longer operate at LOS E or LOS F in the 2030 No-Build condition that operated at LOS E or LOS F in the 2015 No-Build condition during the AM peak hour.

PM Peak

The HCS results indicate LOS D or better for the majority of the intersections (53 of the 71 intersections) during the 2030 No-Build PM peak hour. Similar to the AM peak hour, there is overall a slight reduction in LOS between the 2015 No-Build and 2030 No-Build, due to additional traffic demand in the corridor in the PM peak hour. One of the intersections reduced from LOS E to LOS F, four of the intersections became LOS E or LOS F, while 16 of the intersections had the same LOS as the 2015 No-Build (11 with an increase in delay, two with a decrease in delay, and three intersections having no change in delay). One intersection which operated at LOS E in the 2015 No-Build condition will operate at LOS D or better in the 2030 Build condition.

2030 No-Build Condition – Intersections –Summary

Based on the HCS analysis of the signalized intersections in the I-95/I-395 corridor, there is a reduction in traffic operations (LOS) in both the AM peak hour and PM peak hour from the 2015 No-Build condition to 2030 No-Build condition, which is anticipated from the projected traffic growth in the corridor.

5. 2030 Build Conditions - Intersections

The HCS results of the AM and PM peak hour 2030 Build conditions for I-95/I-395 intersections are summarized in **Appendix C Tables 31 and 33**. The results of the AM and PM peak hour 2030 Build conditions LOS and delay from the HCS analysis are graphically illustrated in **Figures VII-5 and VII-6**, respectively.

The table below shows the intersections with a LOS of E or F for the 2030 Build Conditions for both the AM and PM Peak hour:

Summary of the Intersections with a LOS of E or F for the 2030 Build Conditions

ID	Crossroad Interchange	Cross Street	AM		PM	
			2030 Build		2030 Build	
			Delay	LOS	Delay	LOS
310	Garrisonville Road	Salisbury Drive and Stafford Market Place	71.1	E	95.1	F
311	Garrisonville Road	Jefferson Davis Hwy, and Washington Drive	84.8	F	182.6	F
4	Russell Road	I-95 SB On-Ramp/Off-Ramp	812	F	>1000	F
314	Russell Road	I-95 NB Off-Ramp	>1000	F	>1000	F
316	Joplin Road	I-95 NB On-Ramp/Off-Ramp	74.3	F	117.4	F
317	Joplin Road	Jefferson Davis Hwy, and Fuller Road	68.9	E	74.1	E
319	Dumfries Road	Old Stage Coach Road, Jefferson Davis Highway and North Fraley Boulevard	*	*	226.8	F
321	Dale Boulevard	Gideon Drive	180.9	F	149.1	F
329	Gordon Boulevard	Old Bridge Road	71.2	E	79.4	E
59	Lorton Road	I-95 SB on-ramp/off-ramp	*	*	71.8	E
195	Fairfax County Parkway	I-95 NB off-ramp and Newington Road	275.6	F	210	F
339	Fairfax County Parkway	Terminal Road	134.9	F	121.5	F
278	Franconia-Springfield Parkway	I-95 HOV/Bus/HOT on-ramp/off-ramp	99	F	*	*
283	Franconia Road	Backlick Road	153.2	F	*	*
343	Duke Street	Beauregard Street	71.6	E	85.9	F
102	Seminary Road	Mark Center Drive	62	E	*	*
354	Shirlington Rotary	Martha Custis Drive and Gunston Road	36.3	E	*	*
383	Shirlington Rotary	I-395 NB off-ramp/I-395 SB HOV/Bus/HOT Ramp (PM)	*	*	61.9	E
114	South Glebe Road	24th Road	*	*	98.8	F
357	South Glebe Road	South Four Mile Run Drive and West Glebe Road	70.5	E	*	*
358	Eads Street	Army Navy Drive	57.8	E	62.3	E

*HCS results indicate LOS D or better.

AM Peak

The HCS results indicate LOS D or better for the majority of the intersections (58 of the 75 intersections) in the AM peak during the 2030 Build condition. Overall, there is a slight improvement in the I-95/I-395 intersections in the 2030 Build conditions intersections as compared to the 2030 No-Build condition intersection. Seven of the intersections improved from LOS F in the 2030 No-Build condition to LOS D or better in the 2030 Build condition. Similarly, one of the intersections improved from LOS E in the 2030 No-Build condition to LOS D or better in the 2030 Build condition. Two of the intersections improved from LOS F in the 2030 No-Build condition to LOS E in the 2030 Build condition, while two of the intersections identified above had a decrease in operation from below capacity (LOS D or better) in the 2030 No-Build

condition to LOS E in the 2030 Build condition. Thirteen of the intersections remained at the same LOS in both the 2030 No-Build and 2030 Build condition with two intersections with no change in delay, seven intersections with a higher delay in the No-Build condition, and four intersections with a higher delay in the Build condition.

PM Peak

The HCS results indicate LOS D or better for the majority of the intersections (59 of the 75 intersections) in the PM peak hour in the 2030 Build condition. The signalized intersections in the 2030 Build condition operate similar to the 2030 No-Build condition in the PM peak hour. Five of the intersections that operated at LOS F during the 2030 No-Build condition, will operate at an acceptable LOS (LOS D or better) in the 2030 Build condition. Similarly, two of the intersections that operated at LOS E during the 2030 No-Build condition will operate at an acceptable LOS (LOS D or better) in the 2030 Build condition. One intersection worsened from LOS D or better in the 2030 No-Build Condition to LOS E in the 2030 Build condition. One intersection that operated at LOS E in the 2030 No-Build condition will operate at LOS F in the 2030 Build condition. Thirteen of the intersections remained at the same LOS in both the Build and No-Build conditions, with nine of the intersections having a higher delay in the 2030 Build condition, two intersections with no change in delay, and two intersections having a higher delay in the 2030 No-Build condition.

2030 Build Condition – Intersections –Summary

Based on the HCS analysis of the signalized intersections in the I-95/I-395 corridor, the traffic operations of the intersections in the 2030 Build condition is similar to or slightly better than the traffic operations of the intersections in the 2030 No-Build condition.

6. Intersection Summary

The HCS results indicate a reduction in traffic operations from the existing condition to the 2015 No-Build condition and from the 2015 No-Build condition to the 2030 No-Build condition. It is anticipated that the reduction in operations is a result of additional travel demand in the corridor due to projected growth. However, the intersections operate at a similar or slightly better LOS in the 2015 Build condition and 2030 Build condition as compared to the 2015 No-Build condition and 2030 No-Build condition, respectively. Differences between the Build and No-Build conditions are the result of proposed HOV/Bus/HOT lane improvements and ramping changes, which impact the travel patterns of vehicles accessing or egressing from the proposed HOV/Bus/HOT lanes.

H. SYSTEM-WIDE BENEFITS

To demonstrate the impact that the proposed Project will have on the corridor operations, a system-wide benefits analysis was performed by comparing the LOS and density/delay results on the GP lanes, HOV/Bus/HOT lanes, and cross street intersections along the I-95/I-395 corridor for the No-Build and Build Alternatives in 2015 (opening year) and 2030 (design year) for both the AM and PM peak hours. The criteria for the Build versus No-Build comparison discussed earlier in this chapter were used to calculate the system-wide benefits. According to the criteria, the comparison of the No-Build and Build Alternatives was categorized by GP lanes, HOV/Bus/Hot lanes, and cross street intersections as positive, neutral, or negative. A positive rating indicated that the Build Alternative operated substantially better than the No-Build Alternative. A negative rating indicated the Build Alternative operated substantially worse than the No-Build Alternative, and a neutral rating indicated no substantial difference between the Build and No-Build Alternatives.

According to VDOT guidance, one of the proposed new or revised access requirements is that the proposed access points should not have a significant adverse impact on the operation of the Interstate facility. The segments or intersections categorized as negative in the system-wide benefit analysis will have an adverse impact on the operation of the facility. Therefore, for comparison purposes, the segments or intersections categorized as neutral and positive result would be in the same category, as opposed to a negative or adverse impact.

Figure VII-10 is a summary of all calculations for the year 2015 and 2030 GP lanes, HOV/Bus/HOT lanes, and intersections analyzed within the project area for the 2015 and 2030 AM and PM peak hours. For the opening year (2015) 95% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. This constitutes an overall operational improvement for the corridor when the Build Alternative is compared to the No-Build Alternative. For the design year (2030) 93% of the operational segments analyzed for the Build Alternative show a neutral or positive result as compared to the No-Build Alternative. As with the 2015 analysis, this constitutes an overall operational improvement for the corridor when the Build Alternative is compared to the No-Build Alternative.

THE BUILD ALTERNATIVE PROVIDES OVERALL SYSTEMWIDE BENEFITS.

I. VOLUME AND CAPACITY ANALYSIS

To demonstrate how the proposed Project will effect congestion on GP lanes at representative locations (segments) along the I-95/I-395 corridor, the V/C ratio analysis included a comparison of V/C ratios at representative locations along the corridor for the Build and No-Build Alternatives. The analysis focused on five representative locations that are located at intermittent locations along the corridor and included locations that currently experience severe congestion along the I-95/I-395 corridor, according to the MWCOG.

The V/C ratio is a link-based measure that reflects the level of congestion of a facility or a section of a facility. V/C ratios ranges from less than 0.5 (low or no congestion) to greater than 1.0 (severe congestion), and is a quantitative measure of the level of congestion of a given segment of roadway based on the traffic volume and the capacity of the roadway. **Figure VII-11** shows the 2015 and 2030 comparison of the volume and capacities on the GP and HOV/Bus/HOT lanes for the Build and No-Build Alternative in the AM and PM peak hour at five representative locations along the I-95/I-395 corridor. The table below shows a comparison of the 2030 (design year) V/C ratios on the GP lanes for the No-Build and Build Alternative in the AM and PM at the five representative locations along the I-95/I-395 corridor shown in **Figure VII-11**. According to the table below, an increase in V/C ratio, when comparing the No-Build and Build Alternative, indicates a negative impact on congestion (makes congestion worse), a decrease in V/C ratio indicates a positive impact on congestion (improve congestion), and no change in V/C ratio indicates a neutral impact on congestion (congestion stays the same).

2030 GP lanes V/C Ratio Comparison

Location	Time/Direction	Projected Peak Hour V/C Ratio - 2030 (No-Build/Build)	Congestion Effect (Build vs. No-Build)
I-95; North of Garrisonville Rd	AM Peak/Northbound	1.05/1.11	Negative
I-95; North of Garrisonville Rd	PM Peak/Southbound	0.91/0.77	Positive
I-95; North of Dumfries Rd	AM Peak/Northbound	0.79/0.76	Positive
I-95; North of Dumfries Rd	PM Peak/Southbound	0.80/0.72	Positive
I-95; North of Gordon Blvd.	AM Peak/Northbound	0.67/0.62	Positive
I-95; North of Gordon Blvd.	PM Peak/Southbound	0.59/0.49	Positive
I-395: North of I-495	AM Peak/Northbound	0.57/0.49	Positive
I-395: North of I-495	PM Peak/Southbound	0.71/0.70	Positive
I-395; at 14th Street	AM Peak/Northbound	0.89/0.89	Neutral
I-395; at 14th Street	PM Peak/Southbound	0.70/0.70	Neutral

When comparing the 2030 V/C Ratio results for the No-Build and Build Alternatives on GP lanes at representative locations along the I-95/I-395 corridor in the AM peak hour, the congestion gets worse (negative) at one location, improves (positive) at three locations, and stays the same (neutral) at one location. The one location that indicates a negative impact on congestion (I-95; North of Garrisonville Rd), is located at the southern terminus of the proposed Project. The proposed Project does not include any improvements at this location in the AM peak hour and proposed future improvements south of the propose Project are expected to alleviate these conditions. All three of the representative locations that show an improvement in congestion (positive) are located at locations of severe congestion according to the MWCOG periodic traffic surveys. In addition, one of these three locations (I-95; North of Dumfries Rd) was identified as one of the top 10 congested locations in the National Capital Region CLRP. The one representative location that indicates no impact on congestion (I-395; at 14th Street), is located at the northern terminus of the proposed Project. The proposed Project does not include any improvements at this location in the AM peak hour and future improvements by others north of the proposed Project are expected to alleviate these conditions.

THE PROJECT WILL IMPROVE CONGESTION AT REPRESENTATIVE LOCATIONS ALONG THE CORRIDOR.

When comparing the 2030 V/C Ratio results for the No-Build and Build Alternative on GP lanes at representative locations along the I-95/I-395 corridor in the PM peak hour, the congestion improves (positive) at four of the five locations and stays the same (neutral) at one of the locations. Three of the four locations that show an improvement in congestion are located at locations of severe congestion according to the Metropolitan Washington Council of Governments (MWCOG) periodic traffic surveys. The one representative location that indicates no impact on congestion (I-395; at 14th Street), is located at the northern terminus of the proposed project. The proposed Project does not include any improvements at this location in the PM peak hour and future improvements north of this project are expected to alleviate these conditions.

The volume and capacity comparison for the AM and PM peak hours (**Figure VII-11**) demonstrates how the proposed Project (Build Alternative) will relieve congestion on the GP lanes along the I-95/I-395 corridor

and GP lanes experiencing severe congestion. This will occur as a result of: non-HOV traffic that is expected to divert to the proposed HOT/Bus/HOT lanes in response to the new capacity and improved access; the switch of vehicle users on the GP lanes to high quality public transportation; and the improved modal interrelationships between GP lanes, HOV/Bus/HOT lanes, mass transit and ridesharing along the I-95/I-395 corridor.

A demonstration of non-HOV traffic on GP lanes diversion to the proposed HOT/Bus/HOT lanes as a result of the propose Project is shown in the bar charts in **Figure VII-11**. When comparing the volumes and capacities for the GP lanes and the HOV/Bus/HOT lanes for the No-Build and Build Alternatives for the AM and PM peak hour, the overall volumes and capacities for the HOT/Bus/HOT lanes increase, while there is an overall decrease in volumes and no change to the capacities for the GP lanes. The overall volumes on the HOV/Bus/HOT lanes increase as a result of non-HOV traffic that diverts from the GP lanes to the HOT/Bus/HOT lanes and overall capacities on the HOT/Bus/HOT lanes increase as a result of the additional and new lanes included in the proposed Project. The volumes on the GP lanes decrease as a result of non-HOV traffic that diverts to HOT/Bus/HOT lanes and there is no change in GP lanes capacity, since the proposed Project does not include capacity improvements to the GP lanes.

J. OPERATIONAL ANALYSIS

1. Locations

In addition to HCM analysis, select locations along the study corridor were analyzed further using advanced analysis tools. Since the HCM methodologies do not take into consideration upstream or downstream effects, the intersection LOS analysis portrays a better or worse picture than the actual field operation under congested conditions. Therefore, where corridor intersections were substantially impacted by other intersections on the cross street or provided new direct access to a cross street, the HCS analysis was supplemented with VISSIM or CORSIM micro-simulation modeling and discussion with VDOT. The following locations were identified for additional analysis:

- Eads Street
- Shirlington Rotary
- Seminary Road
- Franconia-Springfield Parkway
- Fairfax County Parkway
- Gordon Boulevard
- Prince William Parkway
- Southern Terminus (flyover from HOV/Bus/HOT lanes to GP lanes north of Garrisonville Road)

In general, the locations identified above are located in developed suburban/urban areas where right-of-way is constrained and congested operations are expected in 2015 and 2030. In some cases, improvements proposed by the Build project do not address every operational concern identified at these locations. Instead, the Build project provides enhancements so that the locations identified above can accommodate additional traffic without significant degradation in operations when compared to the No-Build condition. The operational analyses discussed in this section focus on those differences between No-Build and Build conditions.

2. Analysis Tools

Various analysis tools were selected for each location given the unique issues found there. At Eads Street where closely spaced intersections are present, a VISSIM model was developed to evaluate No-Build and Build traffic operations. At Shirlington Rotary, where complex weaving conditions occur within short distances, a VISSIM model was developed to compare No-Build and Build traffic operations. At Seminary Road, Franconia-Springfield Parkway, Fairfax County Parkway, Gordon Boulevard, and Prince William Parkway, Synchro models were developed in order to better model signal coordination and evaluate queues. At the southern terminus, a CORSIM model was developed in order to evaluate freeway weaving conditions that may occur with the introduction of the flyover north of Garrisonville Road.

VISSIM AND CORSIM WERE USED TO PROVIDE A BETER UNDERSTANDING OF THE OPERATION OF THE SIGNALIZED INTERSECTIONS.

The following provides summaries of the issues identified at each cross location, the improvements proposed by the Build project, and conclusions based on results from the operational analyses.

3. Eads Street

Eads Street crosses I-395 in Arlington County and provides access to the Pentagon. Currently there is direct HOV access from NB I-395 to Eads Street in the AM peak period and from Eads Street to SB I-395 HOV lanes in the PM peak period. Eads Street is a major access point for bus transit and carpoolers. The Build project proposes to enhance access at Eads Street by:

- modifying the existing NB I-395 HOV lanes off-ramp to a reversible HOV/HOT ramp with three lanes of capacity
- expanding Eads Street to a four-lane cross section from the Pentagon to 12th Street.

The proposed improvements preserve existing connectivity in the area and provide additional capacity to meet forecast traffic demand. The proposed improvements are also flexible and do not preclude other transportation improvements contemplated in the area. **Figure VII-12** (Sheet 3 of 3) illustrates the proposed Eads Street Build concept.

Three different scenarios for Eads Street were analyzed. The existing scenario reflects current traffic operations along Eads Street. The ramp intersections with Eads Street are stop-controlled, the intersection of Army-Navy Drive and Eads Street is signalized, and the intersections with Rotary Road are controlled by officers during peak periods. These intersections are modeled as all-way stop controlled intersections to simulate officer control. The No-Build scenario assumes that the HOV/Bus/HOT lanes project is not built and no improvements are made to Eads Street except the improvements in signal timings at the intersection of Eads Street and Army Navy Drive. The Build scenario considers construction of the HOV/Bus/HOT lanes and the improvements identified previously – a reversible ramp and expanded Eads Street cross section. The Build scenario also assumes that Rotary Road and ramp intersections are signalized and coordinated with the Army Navy Drive intersection.

Existing and No-Build Results

Figure VII-12 (Sheets 1 & 2 of 3) summarizes results of the operational analysis. HCM calculated LOS/delay and VISSIM model LOS/delay are summarized for existing, 2030 No-Build and 2030 Build conditions. Approaches where LOS E or worse exist and where queues exceed available storage are also identified. The following intersections will operate at LOS E or worse in existing, 2015, and/or 2030 No-Build conditions:

- Eads Street and North Rotary Road (Intersection 1) – 2030 PM
- Eads Street and South Rotary Road (Intersection 2) – existing PM, 2030 PM

- Eads Street and I-395 SB (Intersection 3) – existing AM, 2030 AM
- Eads Street and I-395 NB (Intersection 4) – existing AM, 2030 AM
- Eads Street and Army-Navy Drive (Intersection 5) – 2030 PM

The following intersections have approaches that will operate at LOS E or worse and/or will have queues exceeding the available storage at the following locations in existing, 2015, and/or 2030 No-Build conditions:

- Eads Street and North Rotary Road (Intersection 1) – NB approach
- Eads Street and South Rotary Road (Intersection 2) – NB, SB and EB approaches
- Eads Street and I-395 SB (Intersection 3) – WB approach
- Eads Street and I-395 NB (Intersection 4) – NB and SB approaches
- Eads Street and Army-Navy Drive (Intersection 5) – NB, SB and EB approaches

The results indicate that Eads Street traffic operations are at near capacity. No-Build results indicate that Eads Street cannot accommodate forecast No-Build demand. Several of the Eads Street intersections will operate at LOS E or worse.

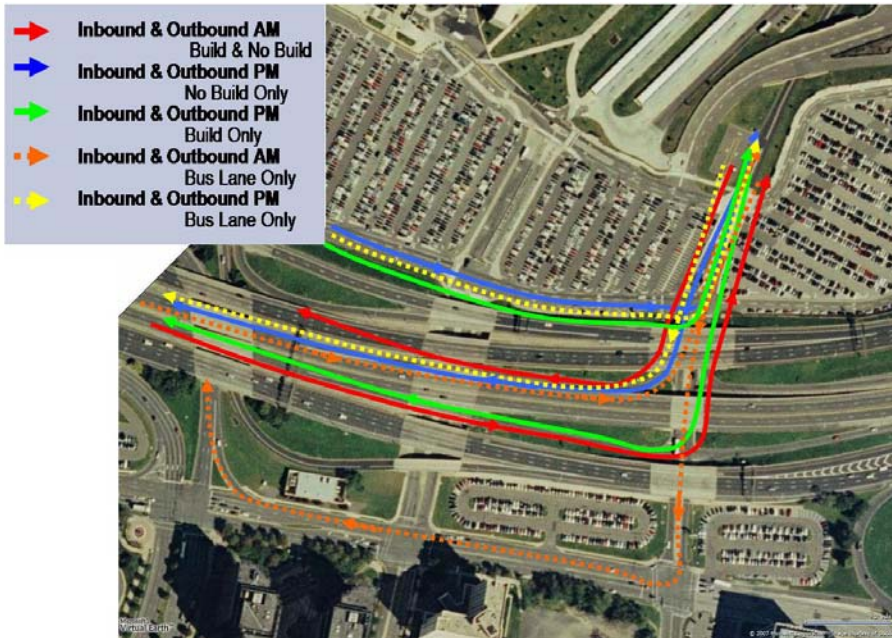
Build Results

The Build project provides additional capacity to Eads Street and enhanced connectivity. Locations identified above with LOS E or worse are improved to LOS D or better. The intersections of Rotary Road and Eads Street which were at LOS F in No-Build will operate at LOS D or better in Build. Delays at I-395 NB and I-395 SB ramp intersections will significantly reduce in Build conditions compared to No-Build conditions. The Build project will also improve locations where the approach is at LOS E or worse and locations where queues exceed available capacity. Overall, the results indicate that the proposed improvement will improve intersection LOS and reduce delay significantly when compared to No-Build conditions while also carrying additional volume through Eads Street.

Transit Considerations

As mentioned previously, bus transit is a major component of the traffic composition at Eads Street. Buses currently use the existing HOV ramp to access the Pentagon Transit Center. An analysis of bus transit travel times was performed in order to specifically estimate the effects of the Build project on transit travel times. Transit travel times for existing conditions, 2030 No-Build, and 2030 Build conditions were obtained from the VISSIM model developed for Eads Street. In addition, these scenarios were also compared to an alternative that will dedicate one ramp exclusively for buses. The figure below illustrates the general ingress/egress routes for buses accessing the Pentagon Transit Center for No-Build, Build, and Bus-only conditions.

General Bus Ingress/Egress Routes (Pentagon Transit Center)



The table below summarizes results of the analysis. In the AM peak hour, Build scenario shows improved transit operations compared to existing and No-Build whereas Build Bus only scenario shows degradation. In the PM peak hour, both Build and Build Bus only scenarios show improvements over existing and No-Build conditions. Overall, Build improvements will provide additional benefits to transit operations when compared to existing, No-Build or the Build with Bus only ramp option.

Estimated Bus Travel Times through Eads Street

Scenario		Average travel time (sec)			
		Existing	2030 No-Build	2030 Build with Bus only ramp	2030 Build
AM	Inbound	204	243	394	95
	Outbound	127	82	387	65
	Round trip	331	325	791	160
PM	Inbound	279	327	120	131
	Outbound	111	224	72	79
	Round trip	390	551	192	210

4. Shirlington Rotary

Shirlington Rotary provides access to both the GP and HOV lanes on I-395 in Arlington County. A reversible north facing ramp provides access from the rotary to the existing NB I-395 HOV lanes in the AM peak period and from SB I-395 HOV lanes to Shirlington in the PM peak period. The rotary connects I-395 with a mixed-use development that includes residential, office, and retail uses on the west side of I-395 and with residential communities on the east side of I-395. The rotary provides multiple entry and exit points to connect these communities with I-395. The Build project proposes constructing a south facing reversible ramp to the rotary. This ramp will provide access from NB I-395 HOV/Bus/HOT lanes to the rotary in the AM peak period and from the rotary to SB I-395 HOV/Bus/HOT lanes in the PM peak period.

Peak hour traffic forecasts indicate that volumes within the rotary will increase significantly because of the Build project. With higher traffic volumes in the rotary it will become difficult for vehicles to merge into the rotary and perform weaves within the rotary in order to access their destination. The Build project proposes signalizing rotary entry points and providing additional storage on approaches to the rotary to accommodate the additional traffic demand. In addition, the Build project proposes to provide a new lane on a portion of the rotary. A concept layout of the rotary is shown in **Figure VII-13** (Sheet 4 of 4).

Existing and No-Build Results

In addition to HCM analysis, a VISSIM model was developed to compare the 2030 No-Build and Build results. A summary of results is shown in **Figure VII-13** (Sheets 1, 2 & 3 of 4). The HCM results indicate that the intersections adjacent to the rotary operate within acceptable LOS for existing and No-Build conditions. The following approaches into the rotary operate at LOS E or worse in existing, 2015, and/or 2030 No-Build conditions according to HCM results:

- S. Shirlington Road entry point to the rotary – existing AM/PM, 2015 AM/PM, 2030 AM/PM
- Quaker Lane entry point to the rotary – existing AM/PM, 2015 AM/PM, 2030 AM/PM

The following operate at LOS E or worse in 2030 No-Build conditions according to VISSIM results:

- I-395 SB GP off-ramp entry point to the rotary
- Quaker Lane entry point to the rotary

Build Results

HCM results indicate that signalization will improve LOS at all approaches identified in existing and No-Build scenarios as having LOS E or worse to LOS B. Of the five new signals proposed for the rotary, all will operate at LOS B except for one. The new south facing reversible ramp intersection with the rotary will operate at LOS E in the PM peak hour.

VISSIM results indicate that all approaches into the rotary will operate at LOS D or better except for the I-395 NB GP off-ramp entry into the rotary and the Quaker Lane entry into the rotary. These two approaches will operate at LOS E in the Build scenario in the AM peak hour. This is an improvement over the No-Build scenario where the Quaker Lane entry point will operate at LOS F.

Overall, the proposed Build improvements at Shirlington rotary will either improve or maintain LOS over No-Build conditions while accommodating additional traffic.

Weaving on I-395 NB GP lanes south of Shirlington Rotary
As mentioned previously, the Build project modifies approaches of the rotary to provide additional storage. As a result of this, the weaving section between I-395 NB entry ramp at King Street and the I-395 NB exit ramp at Shirlington rotary is reduced by approximately 350 ft. Supplementary analysis was performed using VISSIM to analyze the impact of this reduced weaving area during the AM peak hour.

Two set of models, constrained and unconstrained, were developed for existing, 2030 No-Build and 2030 Build conditions. The constrained models are based on actual travel times observed during peak hours and assume similar levels of congestion in 2030 No-Build and Build conditions. The unconstrained models assume lower levels of congestion in 2030 based on planned improvements to I-395 being implemented.

The table below summarizes results of the analysis. Both sets of models show improved level of operations in 2030 Build condition compared to the 2030 No-Build condition. Hence, the build improvements do not degrade operations at this location. Comparing the unconstrained and constrained analysis, the former shows improved level of operations than the latter because downstream congestion significantly degrades the level of operations at this location.

Constrained Model

Location on I-395 NB	Existing		2030 No-Build		2030 Build	
	Density	LOS	Density	LOS	Density	LOS
Section after King St EB entry ramp	35.8	E	41.2	E	35.9	E
Section before King St WB entry ramp	45.7	F	51.8	F	49.0	F
Section after King St WB entry ramp	38.5	E	43.5	E	39.6	E
Section before Shirlington exit ramp	31.4	D	34.3	D	29.8	D

Unconstrained Model

Location on I-395 NB	Existing		2030 No-Build		2030 Build	
	Density	LOS	Density	LOS	Density	LOS
Section after King St EB entry ramp	34.8	D	40.5	E	34.4	D
Section before King St WB entry ramp	44.1	E	49.7	F	46.3	F
Section after King St WB entry ramp	37.4	E	42.0	E	38.5	E
Section before Shirlington exit ramp	30.5	D	33.4	D	29.0	D

5. Seminary Road

Seminary Road crosses I-395 in the City of Alexandria. Adjacent to the Seminary Road interchange are both office and residential developments. A north facing reversible ramp at the interchange provides access from Seminary Road to the existing NB HOV lanes in the AM period and from the SB HOV lanes to Seminary Road in the PM period. The Build concept for the Seminary Road interchange is depicted in **Figure VII-14** (Sheet 3 of 3). The primary features are the addition of a south facing reversible ramp for buses only, improvements to the existing north facing reversible ramp, and improvement to the I-395 SB off-ramp approach at EB Seminary Road.

Peak hour forecasts for Seminary Road indicate that the volumes on the existing north facing reversible ramp will increase significantly between No-Build and Build conditions. For this reason, the Build project

proposes signalizing the ramp approach in the PM peak period and widening the ramp to provide two lanes of storage as it intersects WB Seminary Road.

Existing and No-Build Results

HCM results for Seminary Road are summarized in **Figure VII-14** (Sheets 1 & 2 of 3). The following intersections operate at LOS E or worse in existing, 2015, and/or 2030 No-Build conditions:

- WB Seminary Road and I-395 HOV Ramp (Intersection 5) – 2015 PM, 2030 PM

Intersection approaches operate at LOS E or worse and/or have queues exceeding available storage at the following locations in existing, 2015, and/or 2030 No-Build conditions:

- WB Seminary Road and I-395 SB Off-Ramp (Intersection 1) – NWB approach
- WB Seminary Road and I-395 NB On-Ramp (Intersection 2) – NEB approach
- EB Seminary Road and I-395 NB Off-Ramp (Intersection 3) – SEB approach
- WB Seminary Road and I-395 HOV Ramp (Intersection 5) – SWB approach

Build Results

With the proposed Build project improvements, traffic operations along Seminary Road generally improve. Intersections identified in existing and No-Build scenarios that operate at LOS F are projected to operate at LOS C or better . There is reduction in queue lengths between No-Build and Build conditions. There are a fe locations in the Build scenario where queues exceed available storage. These differences in queue length between No-Build and Build at these locations are small. The proposed improvements accommodate additional demand at Seminary Road without further degrading traffic operations at the interchange.

6. Franconia-Springfield Parkway

Franconia-Springfield Parkway crosses I-95 just south of the I-95/I-395/I-495 Springfield interchange in southern Fairfax County. Access to the existing HOV lanes is currently provided by two reversible ramps. In the AM period, the ramps provide access to/from the NB HOV lanes and in the PM period access is provided to/from the SB HOV lanes. The highway connects the reversible HOV lanes with residential areas west of I-95 and the Franconia-Springfield transit station which provides access to bus transit, commuter rail, Amtrak, and Metro. The Build project will allow HOV and buses to use the existing reversible ramps for free and single occupant vehicles to use these ramps for a variable toll.

Peak hour volume forecasts indicate that No-Build and Build volumes on the reversible ramps at Franconia-Springfield Parkway will increase significantly compared to existing volumes. In the future, the Parkway will not only provide access to transit but also serve as a major route for traffic intended for the Engineer Proving Grounds (EPG). The EPG is expected to receive an influx of jobs related to recommendations by BRAC. In order to accommodate this demand, the Build project proposes modifying the existing reversible ramps to increase capacity at the intersection where the two reversible ramps cross Franconia-Springfield Parkway. The concept layout is depicted in **Figure VII-15** (Sheet 3 of 3).

Existing and No-Build Results

Figure VII-15 (Sheets 1 & 2 of 3) summarizes HCM LOS and intersection delay for Franconia Springfield Parkway and identifies where approach delays or queues may cause operational problems. The No-Build results illustrate that the existing configuration cannot accommodate forecast demand at this interchange. In the 2030 No-Build scenario, the intersection of the existing HOV ramps and Franconia-Springfield Parkway will operate at LOS F and average queues at the intersection will exceed available storage capacity.

Build Results

The Build project proposes to improve the operational performance by expanding the intersection capacity and maximizing the use of the existing bridge structure where the HOV ramps intersect Franconia-Springfield Parkway. Results indicate that while some queue lengths on Franconia Springfield Parkway will exceed available storage, intersection delay will be greatly reduced over No-Build conditions. The intersection will still operate at LOS F in the 2030 Build scenario. The Build demand volumes forecasted at this interchange are beyond the capacity of a one lane ramp. The improvements provided by the Build project will help expand the capacity of the intersection in anticipation of higher volumes over the No-Build condition. The modified intersection will accommodate additional traffic volumes and improve traffic operations compared to the No-Build scenario.

7. Fairfax County Parkway

Fairfax County Parkway crosses I-95 in southern Fairfax County. There is currently no direct access to/from Fairfax County Parkway and the existing HOV lanes. Several improvement projects related to Fairfax County Parkway are planned to occur during the same time frame as the proposed Build project. Recommendations by BRAC include relocating thousands of jobs to the Engineer Proving Grounds (EPG) located just north and west of the Fairfax County Parkway interchange. An interchange modification report, currently in the draft phase, recommends changes to the interchange in order to improve access to the EPG. The extension of Fairfax County Parkway between Rolling Road and Fullerton Road is also expected to begin construction. The extension includes:

- Interchange between Fairfax County Parkway and Rolling Road with direct access to EPG
- Removal of at grade intersection of Fairfax County Parkway and Fullerton Road
- Interchange between Fairfax County Parkway and Boudinot Drive to replace access lost at Fullerton Road

The improvements identified here are expected to be in place by 2015 except for the Boudinot Drive interchange. This interchange is expected to be constructed by 2030.

The Build project proposes adding a reversible ramp near the Fairfax County Parkway interchange with I-95. The reversible ramp will connect at the intersection of Boudinot Drive and Alban Road. This intersection currently provides access to I-95 SB GP lanes. The Build project will modify this access so that I-95 SB GP lanes are accessed directly from Fairfax County Parkway.

Peak hour volume forecasts indicate that completion of Fairfax County Parkway and development of the EPG will significantly increase traffic on Fairfax County Parkway. In general, the Build project shifts traffic from Fairfax County Parkway to the Boudinot Drive access point. The Build project proposes improvements to the intersections of Boudinot Drive with Fullerton Road and with Alban Road to accommodate these traffic shifts. A conceptual layout is shown in **Figure VII-16** (Sheets 3 & 4 of 4).

Analysis Scenarios

The operational analysis for Fairfax County Parkway focuses on the ability of the intersections along Boudinot Drive to accommodate the traffic shifts caused by the Build project. Given that not all the improvements to be built by others at the Fairfax County Parkway interchange are not all anticipated to be constructed by 2015, different assumptions were made for the 2015 and 2030 No-Build and Build scenarios. The 2015 No-Build and Build scenarios assume the following improvements to be constructed:

- EPG access ramp modifications to I-95/Fairfax County Parkway interchange in order to accommodate traffic demand increases resulting from BRAC recommendations
- Completion of Fairfax County Parkway between Fullerton Road and Rolling Road
- Removal of at grade intersection of Fairfax County Parkway and Fullerton Road

The 2030 No-Build and Build scenarios assume that all these improvements will be constructed along with the Boudinot Drive interchange.

Existing and No-Build Results

Figure VII-16 (Sheets 1 & 2 of 4) summarizes HCM LOS and intersection delay for the intersections on Boudinot Drive in the No-Build scenario. The table also identifies intersection approaches where operational concerns may exist because of delays or queues. As indicated in the table, the Boudinot Drive and Fullerton Road (Intersection 2) operates at LOS E or worse in 2030 AM No-Build conditions.

Intersection approaches operate at LOS E or worse and/or have queues exceeding available storage at the following locations in existing, 2015, and/or 2030 No-Build conditions:

- Boudinot Drive and Alban Road (Intersection 1) – NB and EB approaches
- Boudinot Drive and Fullerton Road (Intersection 2) – EB, WB, and NB approaches

Build Results

In the 2015 Build scenario, where the Boudinot Drive interchange is not constructed, the existing intersection footprints can accommodate the additional traffic demand on Boudinot Drive. Both intersections will operate at LOS D or better. In the 2030 Build scenario where the Boudinot Drive interchange is constructed, spot improvements to the intersections on Boudinot Drive were analyzed in order to improve operations. **Figure VII-16 (Sheets 1 & 2 of 4)** shows Build results after considering these spot improvements due to which both intersections operate at LOS D or better. The proposed improvements will maximize intersection capacity within existing right-of-way and will maintain LOS D or better along Boudinot Drive.

8. Gordon Boulevard

Gordon Boulevard (Route 123) crosses I-95 in Prince William County just south of the Occoquan River. Access to the existing HOV lanes is provided at Gordon Boulevard through a reversible ramp that intersects Gordon Boulevard at a signal. The ramp provides access from Gordon Boulevard to the NB HOV lanes in the morning peak period and access from the SB HOV lanes to Gordon Boulevard in the evening peak period. The Build project will allow HOV and buses to use this access point for free and single occupant vehicles to use this access point for a variable toll. A heavily used commuter lot at the intersection of Gordon Boulevard and Old Bridge Road is located close to the existing HOV access point.

Peak hour forecasts indicate that volumes will significantly increase on the Gordon Boulevard access ramp between No-Build and Build conditions. To accommodate this additional traffic, the Build project proposes to modify the lane configurations for the HOV/Bus/HOT lanes ramp approach as it intersects Gordon Boulevard. **Figure VII-17** (Sheet 3 of 3) shows a concept layout for this intersection. The HOV/Bus/HOT lanes ramp approach is currently configured as a dedicated right lane to NB Gordon Boulevard and a dedicated left turn lane to SB Gordon Boulevard. The Build project proposes to change this configuration to a dedicated right turn lane and a shared left and right turn lane in order to accommodate higher demand in the PM peak period for traffic from HOV/Bus/HOT lanes to NB Gordon Boulevard.

Existing and No-Build Results

Figure VII-17 (Sheets 1 & 2 of 3) shows operational results for the HOV/Bus/HOT lanes ramp intersection with Gordon Boulevard along with several adjacent signalized intersections on Gordon Boulevard. HCM LOS and intersection delay is summarized and approaches where delay or queues may cause operational issues are identified.

The following intersections will operate at LOS E or worse in existing, 2015, and/or 2030 No-Build conditions:

- Gordon Boulevard and Old Bridge Road (Intersection 1) – existing PM, 2015 AM/PM, 2030 AM/PM
- Gordon Boulevard and Horner Road (Intersection 5) – 2015 AM, 2030 AM

Intersection approaches will operate at LOS E or worse and/or have queues exceeding available storage at the following locations in existing, 2015, and/or 2030 No-Build conditions:

- Gordon Boulevard and Old Bridge Road (Intersection 1) – NB, SB, and EB approaches
- Gordon Boulevard and Devils Reach Road (Intersection 2) – EB and WB approaches
- Gordon Boulevard and Horner Road (Intersection 5) – NB, SB, and EB approaches

Build Results

Results for the Build scenarios indicate that the Build project will not exacerbate No-Build conditions. LOS does not degrade between No-Build and Build scenarios. LOS E and LOS F will still occur in peak periods where Gordon Boulevard crosses Old Bridge Road and Horner Rd however, Horner Rd intersection will improve to LOS D by reconfiguring the dedicated right turn lanes on Gordon Boulevard to shared thru and right turn lanes. Locations where intersection approaches operate at LOS E or worse and/or have queues that exceed available storage are similar to the No-Build conditions. The Build project does not improve all operational concerns identified on Gordon Boulevard. However, it will maintain No-Build traffic operations while accommodating additional traffic.

9. Prince William Parkway

Prince William Parkway crosses I-95 in eastern Prince William County. Existing access to the HOV lanes is provided by a reversible ramp that enters/exits a commuter lot adjacent to Prince William Parkway. The commuter lot is accessed via an entrance on Prince William Parkway and an entrance on Telegraph Road. Prince William Parkway access to the commuter lot is controlled by a signal. Telegraph Road access to the commuter lot is stop-controlled. **Figure VII-18** (Sheet 1 of 3) includes an aerial photo of the interchange and commuter lot. The reversible ramp provides NB access to the HOV lanes in the AM peak period and access to Prince William Parkway from the SB HOV lanes in the PM peak period. The Build project will maintain HOV and bus access at this ramp and also allow tolled single occupant vehicles to use the ramp.

Peak hour volume forecasts indicate that volumes will significantly increase on the reversible ramp at Prince William Parkway between No-Build and Build conditions. Since access to the reversible ramp is via the commuter lot, traffic volumes inside the lot are expected to increase significantly as well. To manage this increased demand through the commuter lot to access the HOV/Bus/HOT lanes, the Build project proposes to signalize the Telegraph Road entrance to the commuter lot (intersection 4 in **Figure VII-18** (Sheet 1 of 3)), signalize one of the internal circulation roadways inside the commuter lot (intersection 3 in **Figure VII-18** (Sheet 1 of 3)) and re-stripe the approach from the commuter lot to Prince William Parkway. The commuter lot approach is currently configured as dual right lanes to WB Prince William Parkway and a shared thru left

turn lane to EB Prince William Parkway. The Build project proposes to change this configuration to a dedicated free right turn lane, a thru lane and a left turn lane in order to accommodate higher demand in the PM peak period for traffic from the commuter lot.

At Telegraph Road, the Build project does not propose any geometry changes, but recommends to signalize the existing three-leg intersection. For the internal circulation roadway intersection, some geometry changes are proposed along with signalization in order to provide sufficient through capacity inside the commuter lot. Proposed geometry changes at this intersection are shown in **Figure VII-18** (Sheet 3 of 3).

Existing and No-Build Results

Results from the operational analyses are shown in **Figure VII-18** (Sheets 1 & 2 of 3). HCM LOS and intersection delay are summarized and approaches where delay or queues may be of concern are identified.
The following intersections will operate at LOS E or worse in existing, 2015, and/or 2030 No-Build conditions:

- Prince William Parkway and Park & Ride Road South Entrance (Intersection 1) – 2030 PM
- Park & Ride Road South Entrance and HOV Ramp Terminus (Intersection 4) – Existing PM, 2015 PM, 2030 PM

Intersection approaches that will operate at LOS E or worse and/or have queues exceeding available storage at the following locations in existing, 2015, and/or 2030 No-Build conditions:

- Prince William Parkway and Park & Ride Road South Entrance (Intersection 1) – SB and WB approaches
- Prince William Parkway, Summerland Drive, and York Drive (Intersection 2) – NB, SB, and EB approaches
- Park & Ride Road South Entrance and HOV Ramp Terminus (Intersection 4) – NB approach

Build Results

In the Build scenarios, the analysis indicates that LOS D or better can be maintained at all intersections along Prince William Parkway. Some of the operational concerns identified above in the No-Build condition still occur but the Build project does not significantly degrade these conditions. Signalization of the intersection of the Park & Ride Road South Entrance and HOV Ramp Terminus addresses the operational concerns identified in the existing and No-Build scenarios. The proposed improvements at Prince William Parkway will help to maintain LOS D or better while accommodating the additional traffic because of the Build project.

10. Southern Terminus

The proposed Build project terminates in the southbound direction just north of the Garrisonville Road interchange. **Figure VII-19** (Sheet 2 of 2) depicts the proposed configuration. A flyover ramp takes traffic from the HOV/Bus/HOT lanes to the GP lanes. The flyover ramp enters the GP lanes on the right side of traffic. An auxiliary lane continues from the entry of the flyover to the exit for WB Garrisonville Road. The distance between the flyover entry and the exit for WB Garrisonville Road is approximately 2,500 feet.

A CORSIM model was developed to examine the traffic operations of the weaving condition introduced by the flyover. **Figure VII-19** (Sheet 1 of 2) summarizes the results along I-95 just north of the Garrisonville Road interchange in both the No-Build and Build conditions. HCM and CORSIM results are summarized.

Existing and No-Build Results
The No-Build results indicate that LOS on I-95 SB GP lanes north of the Garrisonville Road interchange varies between C and E in 2015 and 2030 during the PM peak hour. The successive loop ramps at the Garrisonville Road interchange will operate at LOS F in 2030 No-Build conditions.

Build Results
The Build results indicate that LOS C and D can be maintained for 2015 conditions, similar to No-Build. However, in 2030, high through volumes along I-95 SB will result in LOS F on I-95 SB approaching the Garrisonville Road interchange. This congested condition is anticipated to be addressed by the I-95/I-395 HOV/Bus/HOT Lanes (Southern Portion) project currently under separate study.

11. Operational Studies Conclusions

It is expected that congested conditions will occur along many of the arterials crossing the I-95/I-395 Build project corridor. This congestion will occur even without the construction of the Build project. The operational study locations are also within developed areas where existing right-of-way is limited. The ability to expand roadway capacity without significant takings of land is also limited. Therefore addressing every congested movement within the Build project corridor does not fit within the Need and Purpose of the Build project. The improvements provided by the Build project maximize cross-road intersection capacity within existing right-of-way in order to prevent degradation of traffic operations when compared to No-Build traffic operations.

THE BUILD CONDITION RESULTS IN BETTER TRAFFIC OPERATIONS THAN THE NO-BUILD CONDITION.

I. CRASH DATA

For the purpose of the crash analysis, the study area along the I-95/I-395 corridor from Garrisonville Road to George Washington Memorial Drive was divided into 13 segments consisting of each of the exits along the section of roadway (see Table below: List of Study Segments and Annual Average Crash Frequencies and Rates). Considering the close proximity of the interchanges of Exit 8 (Washington Boulevard (Route 27) – Exit 8A, Columbia Pike (Route 244) – Exit 8B, and Jefferson Davis Highway (Route 1) – Exit 8C), the segment for these three interchanges is analyzed as one segment.

The crash data for the study area of I-95/I-395 for the last 3 years (2004-2006 inclusive) provided by the VDOT was reviewed. Collision plots were developed using GIS (**Figure VII-20**) for each of the interchanges (study segments) including the summary of crashes by type for each of the study segments. For the study area as a whole, there were 8,115 crashes along I-95/I-395 corridor (northbound, southbound and reversible). The three highest occurrence type of crash are listed and shown on Figures below**:**

- Rear-End crashes account for a total of 4,380 of the total 8,151 crashes (53.3% of the total crashes). 4,162 of these crashes occurred on the GP lanes (53.4% of all GP lane crashes) and 188 occurred on the HOV lanes (51.6% of all HOV lane crashes).
- Sideswipe – Same Direction account for a total of 1,771 of the total 8,151 crashes (21.7% of the total crashes). 1,730 of these crashes occurred on the GP lanes (22.2% of all GP lane crashes) and 41 occurred on the HOV lanes (11.3% of all HOV lane crashes).

- Fixed Object – Off Road account for a total of 1,702 of the total 8,151 crashes (20.9% of the total crashes). 1,588 of these crashes occurred on the GP lanes (20.4% of all GP lane crashes) and 114 of these crashes occurred on the HOV lanes (31.3% of all HOV lane crashes).
- All other crash types produced minimal number of crashes on both the GP lanes and the HOV lanes.

Crash rates, expressed as number of crashes per hundred-million vehicle miles traveled (HMVMT), were calculated based on the crash data provided by VDOT and the Average Annual Daily Traffic AADTs obtained from VDOT's traffic website (as shown in **Figure VI-1**). The crash rate per HMVMT for urban interstates in Virginia from 2004-2006 was 104.98. This rate is substantially lower than all of the segments along the I-95/I-395 corridor with the exception of the far southern end of the project at Garrisonville Road. The crash rates for each of the segments along the I-95/I-395 Corridor as well as the Springfield Interchange (broken into the respective interstates) are shown in the **Table** below.

List of Study Segments and Annual Average Crash Frequencies and Rates

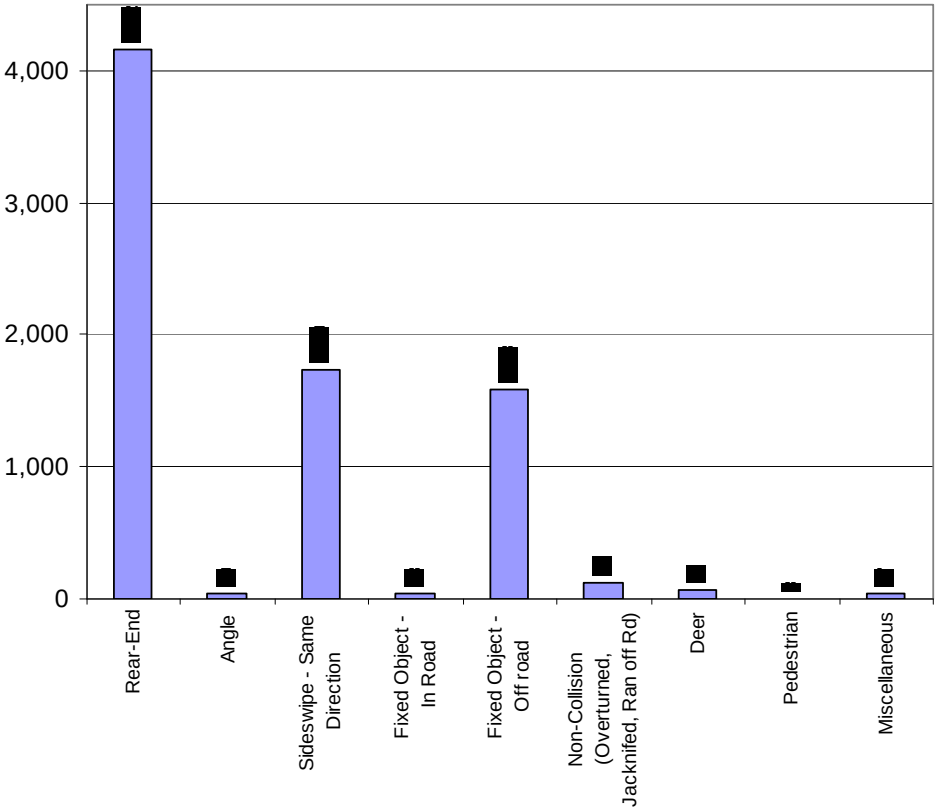
Roadway Section	Milepost limits	Length (miles)	Annual Number of Crashes (based on years 2004-2006)				Average AADT*	Average Crash Rate (per HMVMT)
I-95/I-395 Corridor			**NB**	**SB**	**Rev**	**Total**		
Garrisonville Road (Route 610)	143 – 146	4	165	121	--	286	62,250	104.9
Russell Road	146 – 149.5	3.5	205	244	--	449	66,000	177.5
Joplin Road (Route 619)	149.5 – 152	3	265	157	--	422	64,000	200.7
Dumfries Road (Route 234)	152 – 155	3	232	433	5	670	63,750	319.9
Dale Boulevard (Route 784)	155 – 158	3	260	320	33	613	57,500	324.5
Prince William Parkway (Route 3000)	158 – 160.5	2.5	427	221	17	665	70,750	343.4
Gordon Boulevard (Route 123)	160.5 – 163.5	3	381	410	47	838	84,500	301.9
Lorton Road (Route 642)	163.5 – 166	2.5	190	187	20	397	82,250	176.3
Fairfax County Parkway (Route 7100)	166 – 169	3	221	453	59	733	91,750	243.2
Springfield Interchange – See Below								
Little River Turnpike/Duke Street (Route 236)	2 – 5	3	377	413	49	839	94,000	271.7
King Street (Route 7)	5 – 7.5	2.5	245	179	33	457	96,750	172.5
Washington Boulevard (Route 27)/Columbia Pike (Route 244)/ Jefferson Davis Highway (Route 1)	7.5 – 10	2.5	309	240	16	565	96,250	214.4
Springfield Interchange			**NB**	**SB**	**Rev**	**Total**		
I-395 (from Springfield Interchange North) GP lanes	0 – 2	2	173	215	--	388	74,500	237.7
I-395 (from Springfield Interchange North) HOV lanes	0 – 2	2	--	--	36	36	40,000	41
I-95 (from Franconia Road to Springfield Interchange) GP lanes	169 – 170.5	1.5	393	315	--	708	101,000	426.8
I-95 (Springfield Interchange south) HOV lanes	169 – 170.5	1.5	--	--	49	49	40,000	74
Average Crash Rate for Virginia Urban Interstates								**104.98**
	GP	**44.4**						
Total of Crashes on I-95/I-395 Corridor	**HOV**	**28.5**	**3,843**	**3,908**	**364**	**8,115**		

Notes:

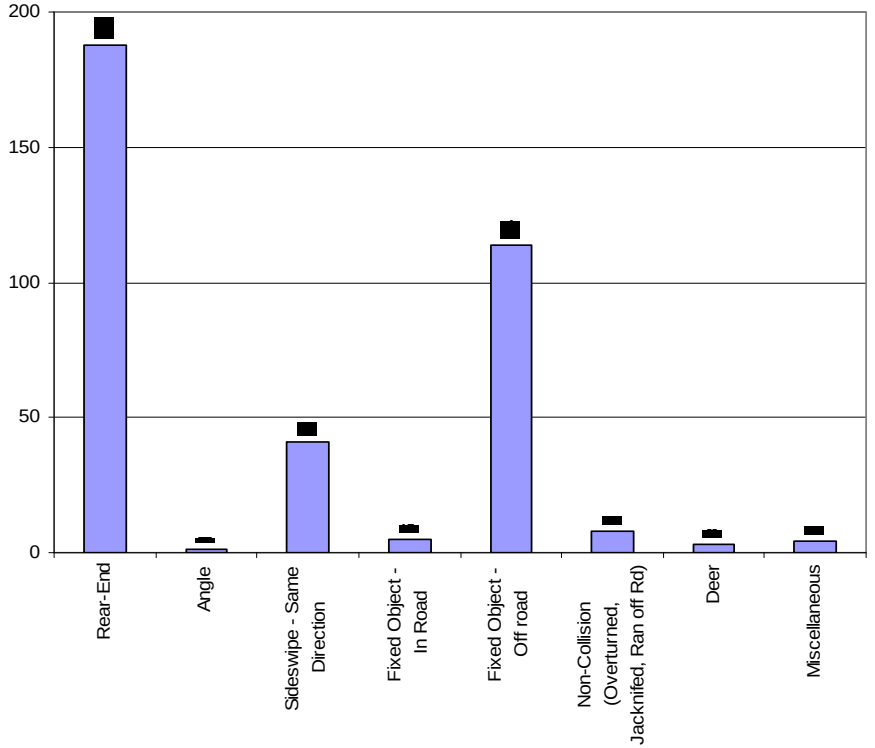
HMVMT - Hundred Million Vehicle Miles Traveled; ((crashes/3 years of data)(100,000,000))/((365 days/year)(AADT)(length of segment))

AADTs were taken from **Figure VI-1** and from VDOT website for traffic volumes. ADT's upstream and downstream in both the northbound and southbound directions were averaged including HOV facilities when appropriate

Number of Crashes by Type (2004-2006) GP Lanes



Number of Crashes by Type (2004-2006) HOV Lanes

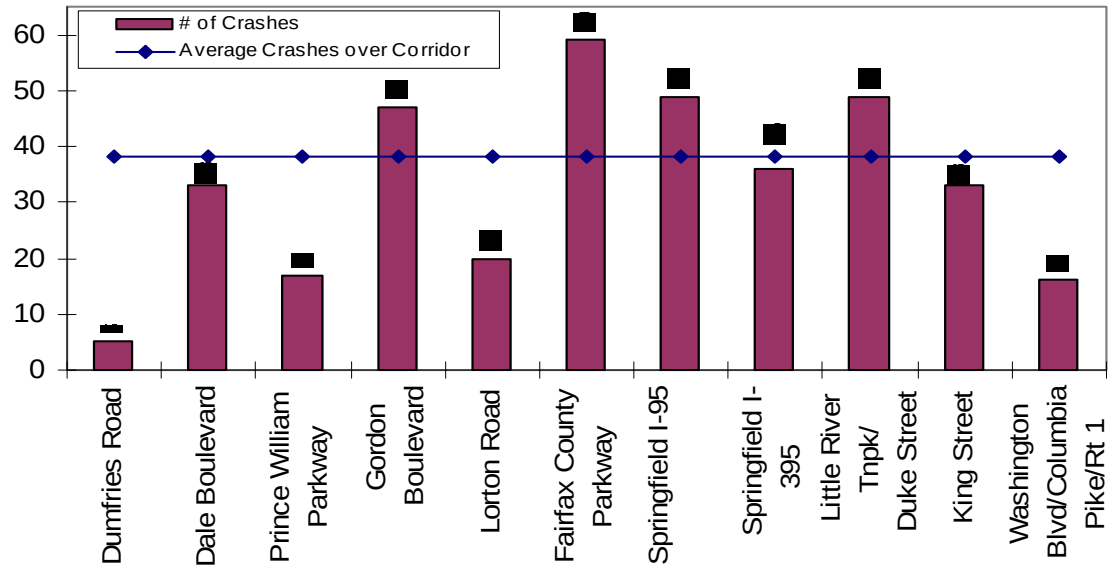


Calculations show that crash averages through the entire I-95/I-395 study corridor over the course of the three year period (2004-2006) for the GP lanes is 58.2 crashes per mile per year (58.2/mile/year) and on the HOV lanes is 4.3 per mile per year (4.3/mile/year), or 5 crashes per mile per month on the GP lanes and one crash on the HOV lanes every 3 months.

THE PROPOSED IMPROVEMENTS ARE NOT ANTICIPATED TO HAVE AN EFFECT ON CRASH RATES IN THE CORRIDOR.

As can be seen in the Figure below, the segments including the interchanges of Gordon Boulevard, Fairfax County Parkway, Springfield Interchange and Little River Turnpike/Duke Street experience crash volumes above the average crash volume for the I-95/I-395 HOV Corridor from Garrisonville to George Washington Parkway.

Reversible Lanes – Summary of Number of Crashes by Segment Compared to Average



There are no design features or changes to driver expectations included in the proposed improvements that are anticipated to have an appreciable positive or negative effect on crash rates in the corridor.

VIII. LAND USE

A. CURRENT LAND USE

This section provides summaries of the existing land use conditions within the four counties and the city of Alexandria that are included in the I-95/I-395 study area, followed by a discussion on the existing land use within the I-95/I-395 study area (See **Figure VIII-1**).

Stafford County

Stafford County encompasses approximately 179,149 acres. The largest land use in the county is residential (30 percent). More than half of the residential uses within the county are rural residential uses and the remaining are urban and suburban residential uses. The second largest land use includes agricultural land uses (26 percent), followed by federal lands (18 percent), resource protection (13 percent), industrial (6 percent), commercial (3 percent) and public use (1 percent). Urban development within Stafford County is limited to an urban service area that is located in the north-central, central, and south-central portions of the county. Almost all of the urban and suburban residential, industrial and commercial development is concentrated within the urban service area and almost all of the rural residential, agricultural, resource protection, and federal land uses are located outside of the urban service areas of Stafford County. The I-95/I-395 study area is located in the central part of the county, where the large majority of the urban development is located. The high percentage of federal land uses within the county is due to the Quantico Marine Base that is located in the northern portion of the county.

Prince William County

Prince William County encompasses approximately 222,930 acres. The land use in Prince William County is primarily residential or undeveloped with several pockets of commercial and mixed use activity at major highway interchanges. Large federal and park land uses are located in the southern portion of the county and include the Quantico Marine Corps Base, the Quantico National Cemetery, and Prince William Forest Park. Urban development within Prince William County is concentrated in the southeastern and northern portions of the county, with semi-rural development in the south-central portions of the County. The I-95/I-395 study area is located in the southeastern portion of the county and is centrally located within areas where high concentrations of urban development are located.

Fairfax County

Fairfax County encompasses approximately 254,052 acres. Over the past 50 years, Fairfax County has changed from a primarily rural and agricultural area to an urbanized metropolitan area. The county, particularly the eastern portion, is now largely developed, and includes a mixture of low-density residential, commercial, industrial, and public land uses. The majority of the land in Fairfax County is used for residences. Industrial and commercial land uses are located along major corridors in the county with high concentrations at highway interchanges. The Shirley Industrial complex is a major industrial land use and is located to the northwest and northeast of the I-95/I-495/I-395 (Springfield) interchange. Other major land uses include parklands and public facilities that include the Fountainhead Regional Park, Mason Neck State Park and the Fort Belvoir Military reservation. About 16 percent of the land in Fairfax County is currently vacant or undevelopable open space. The I-95/I-395 study area is located in the eastern portion of the county where high concentrations of residential, industrial and commercial development are located.

HIGH CONCENTRATIONS OF URBAN DEVELOPMENT EXIST IN THE I-95/I-395 STUDY AREA.

City of Alexandria

The City of Alexandria encompasses approximately 9,860 acres**.** The city is largely developed with high concentrations of residential, commercial, industrial, office, mixed use and public land uses. About half of the land in the city of Alexandria is used for residences with large areas of high density residential development in the western portion of the city and low/medium residential development in the central and eastern portions of the city. The city includes large portions of industrial, commercial, office and institutional land uses. The Landmark Center regional shopping mall is a major commercial land use within the city of Alexandria and is located to the northeast of the I-395/SH 236 (Duke Street) interchange in the western portion of the city. The I-95/I-395 study area is located in the western portion of the city where high concentrations of high density mixed use, residential, industrial and commercial development is located.

Arlington County

Arlington County encompasses approximately 16,616 acres. The county is largely developed and includes residential, commercial, office and large government land uses and large portions of parkland. More than half of the land within the county consists of low density residential land uses. High density residential, office and mixed use developments are located in the north-central portion of the county along the Rosslyn-Ballston corridor. The northeast portion of the county includes high density government, residential and commercial developments. Large government uses within the northeast portion of the county include the Arlington National Cemetery and the Pentagon. The Arlington National Cemetery is partially located within the I-95/I-395 study area to the north of the I-395/Washington Blvd. interchange. The Pentagon is completely within the I-95/I-395 study area and is located to the northwest of the I-395/Jefferson Davis interchange. Other major land uses include the Reagan National Airport and the Army Navy Country Club.

I-95/I-395 Study Area

This section provides seven summaries describing the land use within the I-95/I-395 study area (See **Figure VIII-1**). The summaries are based on seven sections of the study area, starting at I-95/Garrisonville Road interchange (southern study limit) to I-395/Boundary Channel Drive (northern study limit).

- **Garrisonville Road to Camp Barrett Road (Stafford County)** - Land use development within the I-95/I-395 study area from Garrisonville Road to Camp Barrett Road is shown in **Figure VIII-1** (Sheet 1 of 7). Between Garrisonville Road and Camp Barrett Road is a mixture of residential, commercial and federal lands with high intensity residential and commercial development located to the northwest of the I-95/Garrisonville Road interchange. Residential uses are interspersed among commercial developments on both sides of I-95 in the southern and northeastern portions of this area. The Quantico Marine Base is located in the northwestern portion of this area.

- **Camp Barrett Road to Dumfries Road (Stafford and Prince William County)** - Land use development within the I-95/I-395 study area from Camp Barrett Road to Dumfries Road is shown in **Figure VIII-1** (Sheets 1 & 2 of 7). Between Camp Barrett Road and Dumfries Road is a mixture of residential, commercial, parks and federal lands with high intensity development at the I-95/Joplin Road and I-95/Dumfries Road interchanges. High intensity residential and commercial developments are interspersed with medium intensity development to the north of Graham Park Road in the northern potion of the area. The Quantico Marine Corps Base is located in the southwestern portion of this area and Fritter Park is located in the southeastern portion of this area. Locust Shade Park covers a large portion of the southern portion of this area and is located between Russell Road and Joplin Road. Prince William Forest Park is located to the northwest of the I-95/Joplin Road interchange.

- **Dumfries Road to Opitz Boulevard (Prince William County)** - Land use development within the I-95/I-395 study area from Dumfries Road to Opitz Boulevard is shown in **Figure VIII-1** (Sheets 2 & 3 of 7). Between Dumfries Road and Opitz Boulevard is a mixture of residential, commercial and light industrial uses with high intensity commercial development to the southwest of the I-95/Opitz Boulevard interchange and low intensity residential, commercial and light industrial development in the remainder of this area. The southern portion of this area includes large portions of undeveloped land.

- **Opitz Blvd to Lorton Road (Prince William and Fairfax Counties)** - Land use development within the I-95/I-395 study area from Opitz Blvd to Lorton Road is shown in **Figure VIII-1** (Sheets 3 & 4 of 7) . Between Opitz Blvd and Lorton Road is a mixture of residential, commercial, heavy and light industrial uses with high intensity development to the northwest of the I-95/Opitz Blvd interchange and to the west of the Potomac River on both sides of I-95. Light and heavy industrial land uses are located to the northwest of the I-95/Opitz Blvd interchange and to the east of the corridor in the northern portion of this area. The study area is marked by commercial land uses at the I-95/Lorton Road interchange.

- **Lorton Road to Franconia Springfield Highway (Fairfax County)** - Land use development within the I-95/I-395 study area from Lorton Road to Franconia Springfield Highway is shown in **Figure VIII-1** (Sheets 4 & 5 of 7). Between Lorton Road and Franconia Springfield Hwy is a mixture of residential, commercial, heavy and light industrial uses with high intensity industrial development to the east of the corridor in the central portion of this area. High intensity industrial development is also located to the southeast of the I-95/ Franconia Springfield Hwy interchange. Large parcels of undeveloped land are located to the northwest of the I-95/Lorton Road interchange.

- **Franconia Springfield Highway to US Highway 7 (Fairfax County and City of Alexandria)** - Land use development within the I-95/I-395 study area from Franconia Springfield Highway to US Highway 7 (King Street) is shown in **Figure VIII-1** (Sheets 5 & 6 of 7). Between Franconia Springfield Highway and US Highway 7 (King Street) is a mixture of commercial and heavy and light industrial uses with residential uses interspersed among commercial and industrial developments on both sides of I-395. Large portions of high intensity commercial development are located at the I-395/Franconia Road interchange and large portions of commercial development are located at the I-495/I-95/I-395 (Springfield) interchange. The I-395/SH 236 (Duke Street) interchange is marked by high intensity mixed use development. The Landmark Center regional shopping mall is located to the northwest of the I-395/SH 236 (Duke Street) interchange.

- **US Highway 7 to Boundary Channel Drive (City of Alexandria and Arlington County)** - Land use development within the I-95/I-395 study area from US Highway 7 to Boundary Channel Drive is shown in **Figure VIII-1** (Sheet 7 of 7). Between US Highway 7 and Boundary Channel Drive is a mixture of residential, commercial and government uses. High intensity commercial development are located at the interchanges in the southern portion of this area and high intensity commercial and government uses are located at the I-395/Highway 1 (Jefferson Davis) interchange in the northern portion of this area. Large government uses, that include the Pentagon and the Arlington National Cemetery, are located to the north of the I-395 corridor, in the northern portion of this area.

B. LAND USE PLANS AND FUTURE LAND USE

This section provides summaries of the land use plans and future land use conditions within the four counties and the city of Alexandria that are included in the I-95/I-395 study area.

Stafford County

The Comprehensive Plan for Stafford County and County ordinances guides land use planning in Stafford County. The Plan has several components, including a policy plan, a land use classification system that contains specific development recommendations for vacant or underutilized lands. According to the Comprehensive plan, future residential, industrial, and commercial growth within Stafford County will be within the urban service area that is located in the north-central, central and south-central portions of the county. The entire I-95/I-395 study area within Stafford County is located within this urban service area. The plan designates four urban development areas for 2011 within the urban service area; two of these urban development areas are adjacent to the I-95 corridor to the southeast of the I-95/Garrisonville Road interchange and to the southeast of the I-95/Russell Street interchange.

LAND USE PLANS DESIGNATE SIGNIFICANT FUTURE LAND DEVELOPMENT ADJACENT TO THE I-95/I-395 CORRIDOR.

Prince William County

Future land use within Prince William County is guided by the Long-Range Land Use plan. The plan subdivided the County into two general geographic areas categorized according to their present character and their potential character. The general geographic areas are the Development Area and the Rural Area. The Development Area is that portion of the County that has already been developed or is expected to be developed at residential densities greater than those in the Rural Area and includes established residential, commercial and industrial areas, as well as undeveloped or underdeveloped land expected to meet the County's projected growth. The Long-Range Land Use Plan encourages infill of the Development Area and redevelopment and revitalization of older areas of the County. The Development Areas are located within the southeastern and northern portions of the county. Large portions of the infill development are expected to occur in close proximity to the I-95 corridor that is located in the southeastern portion of the county.

Fairfax County

The Comprehensive Plan for Fairfax County and County ordinances guides land use planning in Fairfax County. The Plan has several components, including a policy plan, a land use classification system, and area plans for each planning district that contain specific development recommendations for vacant or underutilized lands. According to the Fairfax County Comprehensive Plan (2007), the proposed I-95/I-395 improvements intersect portions of two of the four Fairfax County planning areas (Area IV and Area I) and three planning districts: Lower Potomac, Springfield, and Lincolnia. The Lower Potomac and Springfield planning districts are located in Planning Area IV and include the portion of the study area south of the I-495/I-95/I-395 (Springfield) interchange to the southern Fairfax County boundary with Prince William County. The Lincolnia planning district is located in Planning Area I and includes the portion of the study area north of the I-495/I-95/I-395 (Springfield) interchange to the northern Fairfax County boundary with the city of Alexandria.

Based on the County's current comprehensive plan, the established land use patterns in the Lower Potomac and Springfield planning districts (Area IV) along I-95 are expected to change in the future. The planning objectives in the Lower Potomac planning district include the development of a "Town Center" which includes retail business, office uses, cultural facilities and community services for the Lorton-South Route 1 area. The I-95 corridor is centrally located within the Lorton-South Route 1 area and is expected to be a

major access point for the planned town center. The planning objectives for the Springfield planning district include several special developments that are expected to be accessed by I-95. These special developments include the Springfield Community Business Center, the Franconia-Springfield Transit Station Area, the Fort Belvoir Engineer Proving Ground Area, and the I-95 Corridor Industrial Area. The established land use patterns in the Lincolnia planning district (Area I) along I-395 are intensive and are not expected to change substantially in the future. The planning objectives in the Lincolnia planning district include the preservation of stable residential areas through infill development of a character and intensity/density that is compatible with existing residential uses and maintaining the predominantly industrial character of the of the southern portion of the district that includes the Beltway South Industrial Area. For the location of planning districts and other information related to the Comprehensive Plan, please see *Fairfax County Comprehensive Plan* (2007):

City of Alexandria

Future land use within the City of Alexandria is guided by the Alexandria Master Plan. The Master Plan is made up of 15 small area plans. Chapters of the Master Plan are updated on an ongoing basis as needed. Three of the small area plans have study areas that intersect with the I-95/I-395 study area and include, Alexandria West Area, Landmark/Van Dorn Area, and Seminary Hill/Strawberry Hill Area.

Based on the Alexandria Master Plan, the established land use patterns in the Alexandria West Area along I-395 are expected to follow the current land use development pattern. Planning objectives along I-395 includes medium to high density commercial, residential, and mixed use development to the northwest and northeast of the I-395/SH 236 (Duke Street) and I-395/State Highway 7 (King Street) interchanges. The planning objectives for the Landmark/Van Dorn Area include regional commercial and high density commercial residential mixed use that are expected to be accessed by I-395/SH 236 (Duke Street) interchange. The planning objectives for the Seminary Hill/Strawberry Hill Area include high density residential (apartments and multi-family) to the southwest of the I-395/US 7 (King Street) interchange and high density residential (apartments) and medium density commercial (offices) to the southwest and southeast of the I-395/Seminary Street interchange.

Arlington County

The Comprehensive Plan for Arlington County and County ordinances guides land use planning in Arlington County. The Plan has several components, including a general land use plan that is the primary guide for the future development of the County. According to the general land use plan, the Arlington County Board has endorsed a land use policy that concentrates high-density development within two Metro subway corridors within the county and preserves lower-density residential areas throughout the County. One of these two Metro subway corridors, the Jefferson Davis Corridor intersects with the I-95/I-395 study area. The planning objectives for this area include high-medium density residential and mixed use along I-395 to the southwest of I-395/Jefferson Davis interchange.

C. ACTIVITY CENTERS

This section provides summaries of the activity centers within the four counties and the city of Alexandria that are included in the I-95/I-395 study area.

Stafford County

The I-95 interchange at Garrisonville Road is an activity center that is located within the I-95/I-395 study area. According to the Stafford County Comprehensive Plan this activity center is located within the urban

service area of the county (area designated for growth) and is designated for urban residential and commercial uses.

Prince William County

Prince William County identified six Centers of Commerce or activity centers. These Centers of Commerce are planned urban town centers and includes a variety of activities with a regional draw. Four of these designated Centers of Commerce within Prince William County are located within the I-95/I-395 study area and include:

- **Quantico Creek** – The Quantico Creek activity center is located to the west of the I-95/ Dumfries Road interchange and is a regional employment and commercial center. Dumfries Road provides access to this center.

- **Potomac Mills** – The Potomac Mills activity center is located to the northwest of the I-95/Opitz Blvd interchange and contains a regional shopping mall (Potomac Mills mall). The Potomac Mills mall is the second largest shopping mall in the Washington D.C area, behind Tysons Corner Center. Opitz Blvd and Prince William Parkway provide access to the shopping mall.

- **Caton Hill** – The Caton Hill activity center is located to the west of the I-95/Prince William Parkway interchange to the northeast of the Potomac Mills shopping mall and is a regional employment center. Prince William Parkway provides access to this employment center.

- **North Woodbridge** – The North Woodbridge activity center is located to south of the I-95/Gordon Blvd interchange and include an urban mixed use area. Gordon Blvd provides access to this mixed use area.

Fairfax County

As Fairfax County has evolved from a residential suburb to a multi-faceted urbanized area, concentrations of land use and economic activity have developed throughout the county, mostly along major regional roadways, such as the Beltway (I-495), I-95, Arlington Boulevard, I-66, and the Dulles Access/Toll Road. The Fairfax County Comprehensive plan identified two regional activity centers (Franconia-Springfield and Lorton-South Route 1) that are located within the I-95/I-395 study area. Continued development of these activity centers and increases in employment are anticipated in the future.

- **Franconia-Springfield Area** – The Franconia-Springfield area is located in the northern portion of Fairfax County and generally extends along I-95 from Commerce Street to the I-95/Newington Road interchange. The Fairfax County comprehensive plan designates this area as a suburban activity center. The area contains two established employment and retail centers, which includes the Franconia-Springfield Transit Station Area, and the Springfield Community Business Center. The area also contains the Fort Belvoir Engineer Proving Ground, which is expected to receive an influx of jobs as a result of recommendations made by BRAC. The Franconia- Springfield area is located in the southeast corner of the I-95/Franconia Road interchange and includes the Joe Alexander Transportation Center and the Springfield Mall, which is one of the County's largest shopping centers. The Springfield Community Business Center is located to the northwest and southwest of the I-95/Franconia Road interchange and offers a variety of community-serving retail goods and services. The Business Center contains some housing and has the potential for additional mixed-use development and is envisioned to function as the town center of the Franconia-Springfield Area.

- **Lorton-South Route 1 Area** – The Lorton-South Route 1 is a planned activity center that is located on approximately 3,000 acres of land around the I-95 and Lorton Highway interchange in the southern portion of Fairfax County. The Fairfax County comprehensive plan designates this area as a suburban activity center. The majority of the central and northern portion of the area is developed with planned development housing and community-supporting uses and includes the Lorton Town Center, a 235 acre mixed use center, a commuter rail station, retail, light industrial and public uses such as a school and library. The eastern portion of the area contains the Noman M. Cole, Jr. Pollution Control Plant site and its expansion site and the southern portion is predominantly industrial and includes a large private land fill and a quarry. Some commercial and residential uses as well as a golf driving range are also included in the southern portion of the area.

City of Alexandria

One activity center (Landmark/Van Dorn Area) in the city of Alexandria is partially located within the I-95/I-395 study area. The Landmark/Van Dorn Area is located to the west of the I-395/SH 236 (Duke Street) interchange. The Landmark Mall is located in the northern portion of the area and within the I-95/I-395 study area. Plans call for the redevelopment of the mall into a town center for the West End of the City of Alexandria. The town center is planned to be an activity center that include mixed-use entertainment, retail and residential uses.

Arlington County

The Arlington County Comprehensive Plan identified two activity centers (Pentagon City and Chrystal City) that are partially located within the I-95/I-395 study area.

- **Pentagon City** - Pentagon City is located to the southwest of the I-395/Eads Street interchange and is partially located within the I-95/I-395 study area. It is a 234 acre mixed use development in the Pentagon City Metro Station Area with special emphasis on residential development and regional shopping facilities.

- **Crystal City** - Crystal City is located to the southeast of the I-395/Eads Street interchange and is partially located within the I-95/I-395 study area. It is a 391 acre major employment center with significant office and hotel development, and supporting residential and retail development.

D. UTILITIES

Electrical transmission lines, electrical substations and transformers, telecommunications lines and towers, and water and sewage delivery systems are located along the I-95/I-395 corridor.

E. RIGHT-OF-WAY

The proposed project will be located within the existing right-of-way and therefore no new right of way will be required.

THE PROJECT WILL BE LOCATED WITHIN THE EXISTING RIGHT-OF-WAY.

F. LAND USE IMPACTS

A summary of the land use effects of the Build Alternative and No-Build Alternative for the entire length of the project is presented in this section.

Direct Land Use Conversions

The Build Alternative will require no new right-of-way adjacent to the I-95/I-395 corridor. The table below shows the land use related effects for the Build Alternative.

Summary of Land Use Related Effects

Effect	No-Build Alternative	Build Alternative
Direct Land Use Conversion (acres)	0	0
Compatible with Existing Land Use	✓	✓
Consistency with Local Plans		✓
Consistency with Long-Range Transportation Plans		✓
Compatibility with Other Planned Transportation Projects in Northern Virginia	✓	✓

Consistency with Plans and Policies

Improvements to I-95/I-395 are consistent with, Stafford, Prince William, Fairfax, and Arlington County's Comprehensive Plans and the city of Alexandria Master Plan. The table below shows goals, objectives and policies in each of the various comprehensive plans covering the I-95/I-395 study limits that are consistent with the Build Alternative.

THE PROJECT IS CONSISTENT WITH LOCAL AND REGIONAL PLANNING GOALS, OBJECTIVES AND POLICIES.

Consistency with Plans and Policies

Local Plan	Goals, Objectives, and Policies Consistent with Build Alternative
Stafford County Comprehensive Plan	Create a safe road system to permit safe and efficient movement within and through Stafford County.
Prince William County Comprehensive Plan	Encourage planned transportation networks that support designated targeted industries and major activity centers.
Fairfax County Comprehensive Plan	Provide a transportation system that allows for efficient movement of people and goods, and that connects the various land uses in a way that promotes continued economic prosperity and quality of life.
Alexandria Master Plan	In cooperation with other jurisdictions, advocate substantial improvements to major radial commuting facilities, both highway and transit.

Arlington County Comprehensive Plan	Provision of an adequate system of traffic routes which is designed to form an integral part of the highway and transportation system of the County and the region, assuring a safe, convenient flow of traffic, thereby facilitating economic and social interchange in the County

The improvements to I-95/I-395 in the Stafford County portion of the I-95/I-395 study limits are included in the FAMPO 2030, the CLRP for the Fredericksburg area. Improvements to I-95/I-395 located in City of Alexandria, Prince William, Fairfax, and Arlington Counties are included in the fiscally constrained National Capital Region Transportation Plan, the CLRP for the Washington metropolitan region over the next 25 years.

THE PROJECT IS INCLUDED IN CONSTRAINED LONG-RANGE TRANSPORTATION PLANS.

Potential for Induced Development

The relationship between roadway improvements and induced development has created a lot of debate and a variety of opinions regarding sprawl. While it is clear that highways may directly induce development under certain circumstances, this cause and effect relationship does not always transpire when a roadway improvement is made. While it is easy to assert that transportation improvements will have this effect, it is more difficult to predict with confidence when, where, and how much, especially in a dynamic urban/suburban metropolis such as the northern Virginia region, where factors other than transportation influence residential and business location decisions.

IX. ENVIRONMENTAL COMPLIANCE

A Categorical Exclusion (CE) is currently being prepared by VDOT in compliance with the National Environmental Policy Act (NEPA) and was submitted to FHWA for approval in November 2008.

X. CONCEPTUAL GUIDE SIGN LAYOUTS

A generalized conceptual signing plan was prepared for the I-95/I-395 HOV/Bus/HOT lanes, and is presented in **Appendix F**.