



I-95 Corridor Transit and TDM Plan

FINAL REPORT

DRAFT

Prepared for:



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1.0 Introduction

The Commonwealth of Virginia is addressing critical transportation needs for the I-95 corridor. Through a concurrent package of improvements, the Commonwealth will deliver congestion relief, enhance transit and provide new choices on I-95. These concurrent efforts related to the overall strategy to enhance travel and safety are listed below:

1. I-95 HOT/HOV Lanes
2. VDOT Seminary HOV/Transit ramp
3. Transit Improvements

This Final Report presents a recommended program for I-95 transit and transportation demand management (TDM) improvements and is a compilation of findings from the following three technical memoranda that were prepared as part of this study:

- ✓ *Technical Memorandum #1: Existing Service Characteristics*
- ✓ *Technical Memorandum #2: I-95 Corridor Transit and TDM Needs*
- ✓ *Technical Memorandum #3: I-95 Corridor Transit and TDM Plan Recommendations*

All three technical memoranda can be found at the end of this report.

This *I-95 Corridor Transit and TDM Plan* provides the Commonwealth of Virginia with a plan that will complement the I-95 HOT/HOV Lanes improvements. The plan has been developed with the intent of maximizing utilization of the HOT/HOV lanes network and responding to the demand for increased public transportation and ridesharing.

The *I-95 Corridor Transit and TDM Plan* was developed in collaboration with the Secretary of Transportation and the Virginia Public-Private Transportation Act Office. A multi-jurisdictional Stakeholder group was formed early in the study process to provide technical input into the study, with meetings at three key points during the course of the study.

Service and facility improvement recommendations are focused on the needs for commuter trips that originate within the I-95 travel corridor, south of I-495. The identified list of service and facility recommendations is limited to improvements that directly maximize capacity of the I-95 HOT/HOV lanes south of I-495. Consideration has also been given to potential impacts and needs at I-95 commuter trip destinations within I-495. Other corridor service needs, such as VRE service and facility expansion needs, have been identified in *Technical Memorandum #2*, but are not included in this study's plan recommendations, as they do not directly maximize capacity of the I-95 HOT/HOV lanes.

2.0 I-95 HOT/HOV Lane Project Definition

The Virginia Department of Transportation (VDOT) is advancing a new I-95 High Occupancy Toll/High Occupancy Vehicle (HOT/HOV) Lanes project to provide additional HOT and HOV capacity in the corridor and to create a seamless network for travelers along I-95 and I-495. In 2005, VDOT entered into an agreement with Fluor-Transurban to develop a HOV/Bus/HOT lanes system along I-395 and I-95 from the Pentagon area in Arlington County to Spotsylvania County. The project was delayed and VDOT has since decided to move forward with a redefined project. The new I-95 HOT/HOV Lanes project will create continuous HOT/HOV lanes on I-95 from the vicinity of Edsall Road on I-395 in Fairfax County to just south of US 17 (Mills Drive, south of Fredericksburg) in Spotsylvania County.

The portion of the project that is to be completed by 2015 will include the following:

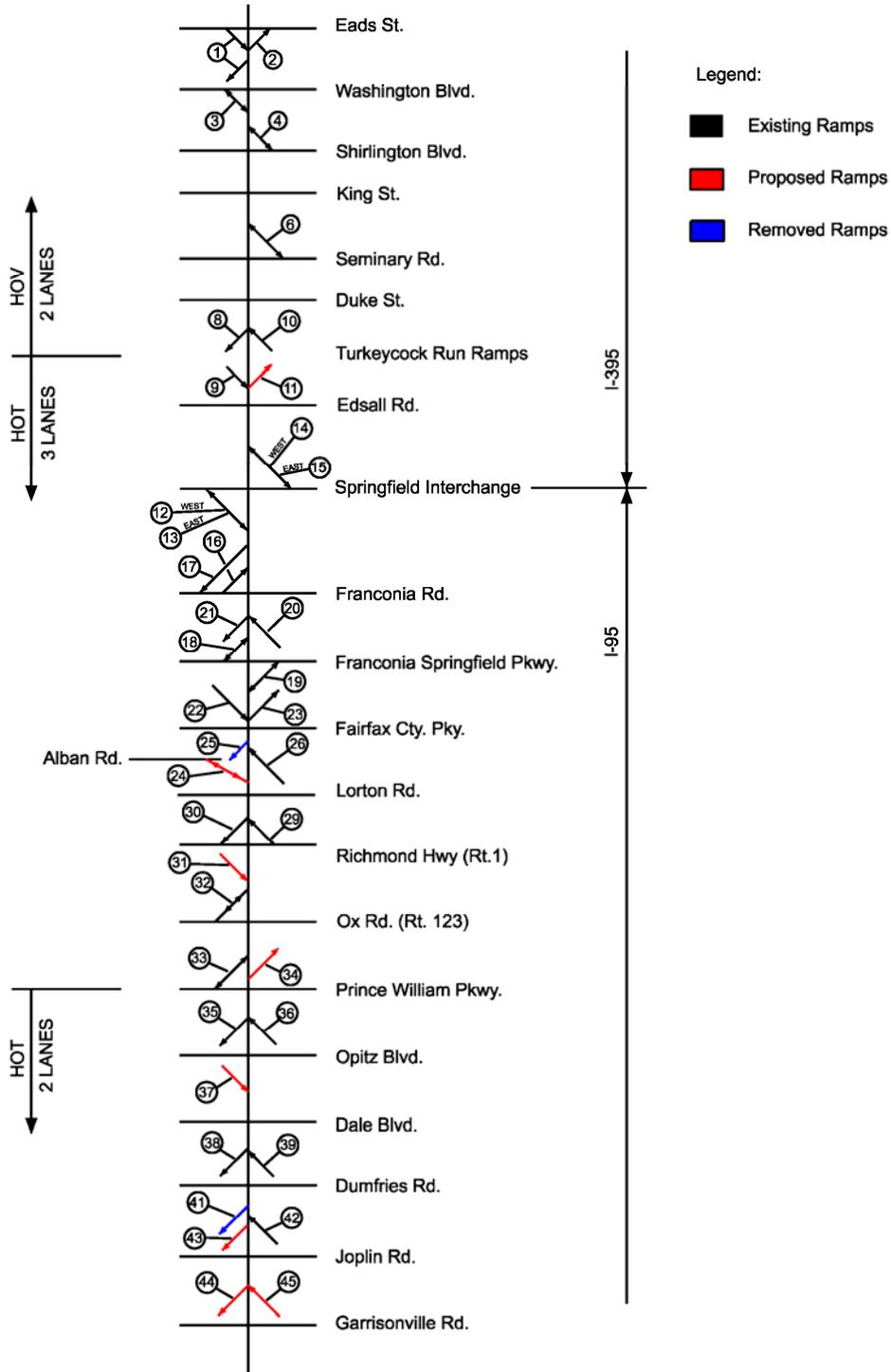
- Constructing two new reversible HOT/HOV lanes for nine miles from Route 610/Garrisonville Road in Stafford County to Route 234/Dumfries Road in Prince William County, where the existing HOV lanes begin
- Widening of the existing HOV lanes from two to three lanes for 14 miles from Prince William Parkway to approximately two miles north of the Springfield Interchange, in the vicinity of Edsall Road
- Improvements to the existing two HOV lanes for six miles from Route 234 to Prince William Parkway
- New or improved access points between the HOT/HOV lanes and the general purpose lanes
- New access between the HOT/HOV lanes and Fairfax County Parkway (at Boudinot Drive)

Access points between HOT/HOV lanes and general purpose lanes are illustrated in **Figure 2-1** (schematic provided by VDOT). This project will create the following new access points:

- For southbound traffic, new flyover ramp access from HOT/HOV lanes to general purpose (GP) lanes between Joplin Road and Garrisonville Road
- For northbound traffic, new access from GP lanes to HOT/HOV lanes between Garrisonville Road and Joplin Road
- Removal of existing southbound access from HOV lanes to general purpose lanes south of Dumfries Road, and constructing a new flyover access ramp further south
- For southbound traffic, new access from GP lanes to HOT/HOV lanes south of Opitz Boulevard
- For northbound traffic, access from HOT/HOV lanes to GP lanes north of Prince William Parkway
- For southbound traffic, new ramp access from GP lanes to HOT/HOV lanes south of Route 1/ Richmond Highway
- For northbound traffic, flyover ramp access from HOT/HOV lanes to Boudinot Drive in the a.m. In the p.m., traffic flows are reversed, providing access from Boudinot Drive to southbound HOT/HOV lanes
- For northbound traffic, new flyover ramp access from HOT/HOV lanes to GP lanes north of Edsall Road

**Figure 2-1
HOT/HOV Lane Access Schematic**

I-95 HOV / HOT Lane Ramps



Carpools with three or more people, vanpools and transit vehicles will have free access to the HOT/HOV Lanes network. The estimated cost of Phase 1 is \$1 billion, and is being financed, constructed and operated under Virginia's Public-Private Transportation Act.

The HOT/HOV lanes are to be extended south to Spotsylvania County, with construction proposed by 2018. Two new HOT/HOV lanes are to be constructed in the median of I-95 from Route 610/Garrisonville Road to US 17 (the Massaponax exit) in Spotsylvania County. Access ramps between HOT/HOV Lanes and general purpose lanes will generally be provided between each interchange.

Dynamic tolling will be used to adjust HOT lane tolls based on real-time traffic conditions, video technology to identify accidents, a series of electronic signs to communicate with drivers and state troopers to ensure enforcement. These strategies are to maintain travel speeds, make travel times more predictable and significantly reduce violators.

VDOT is also proceeding with a separate project. A new HOV ramp is to be constructed at the Mark Center at I-395 and Seminary Road. This ramp will provide access to the third level of the I-395/Seminary Road interchange. Access to the third level will provide HOVs and buses with more direct access to the Mark Center via Seminary Road and Mark Center Drive. This project is to be completed by 2015 at an estimated cost of \$80 million. This project will complement other short and mid-term improvements to the arterial street network to be implemented in conjunction with the Base Realignment and Closure (BRAC) 133 project at Mark Center.

3.0 Demographic and Travel Pattern Characteristics

An important task in this project has been the understanding of existing demographic characteristics and commuter travel patterns. The following section presents a summary of these existing characteristics. More detailed information can be found in *Technical Memorandum #1*.

3.1 Demographic Characteristics

The Metropolitan Washington Council of Governments (MWCOG) and Fredericksburg Area Metropolitan Planning Organization (FAMPO) regional travel demand forecast models were used to determine existing and future demographic characteristics along the I-95 corridor. Population and employment characteristics were determined for the years 2011, 2015 and 2035. Demographic data for the northern portion of the I-95 corridor was obtained from the MWCOG, as used in the approved 2010 Constrained Long-Range Transportation Plan, Version 2.2, Round 8. Demographic data for the southern portion of the corridor was obtained from the FAMPO data used in the FAMPO 2035 Long-Range Transportation Plan.

Tables 3-1 and **3-2** present population and employment projections for traffic analysis zones (TAZs) along the I-95 corridor. Though population and employment is much higher in the northern end of the corridor, growth rates are anticipated to be much higher in the south end of the corridor. Overall, the corridor population is projected to increase by 36% and employment by 45%.

Figures 3-1 and **3-2** illustrate projected 2035 population and employment densities for TAZs along the I-95 corridor. **Figure 3-4** presents 2009 minority population and **Figure 3-5** presents 2009 households below poverty in the I-95 corridor.

Table 3-1
I-95 Corridor Population Projections

County Area	Area Population			2035 - 2015	Percent Change
	2011	2015	2035		
Fairfax	182,767	188,196	207,333	24,566	13.4%
Pr. William	259,823	277,119	330,369	70,546	27.2%
Stafford	103,262	120,675	183,554	80,292	77.8%
Spots./Fred.	107,337	116,848	165,974	58,637	54.6%
Total	653,189	702,838	887,230	234,041	35.8%

Table 3-2
I-95 Corridor Employment Projections

County Area	Area Employment			2035 - 2015	Percent Change
	2011	2015	2035		
Fairfax	75,676	86,324	97,589	21,913	29.0%
Pr. William	71,921	77,261	105,223	33,302	46.3%
Stafford	37,866	43,311	62,004	24,138	63.7%
Spots./Fred.	53,145	56,741	82,192	29,047	54.7%
Total	238,608	263,637	347,008	108,400	45.4%

Figure 3-1
2035 Population Densities in I-95 Corridor

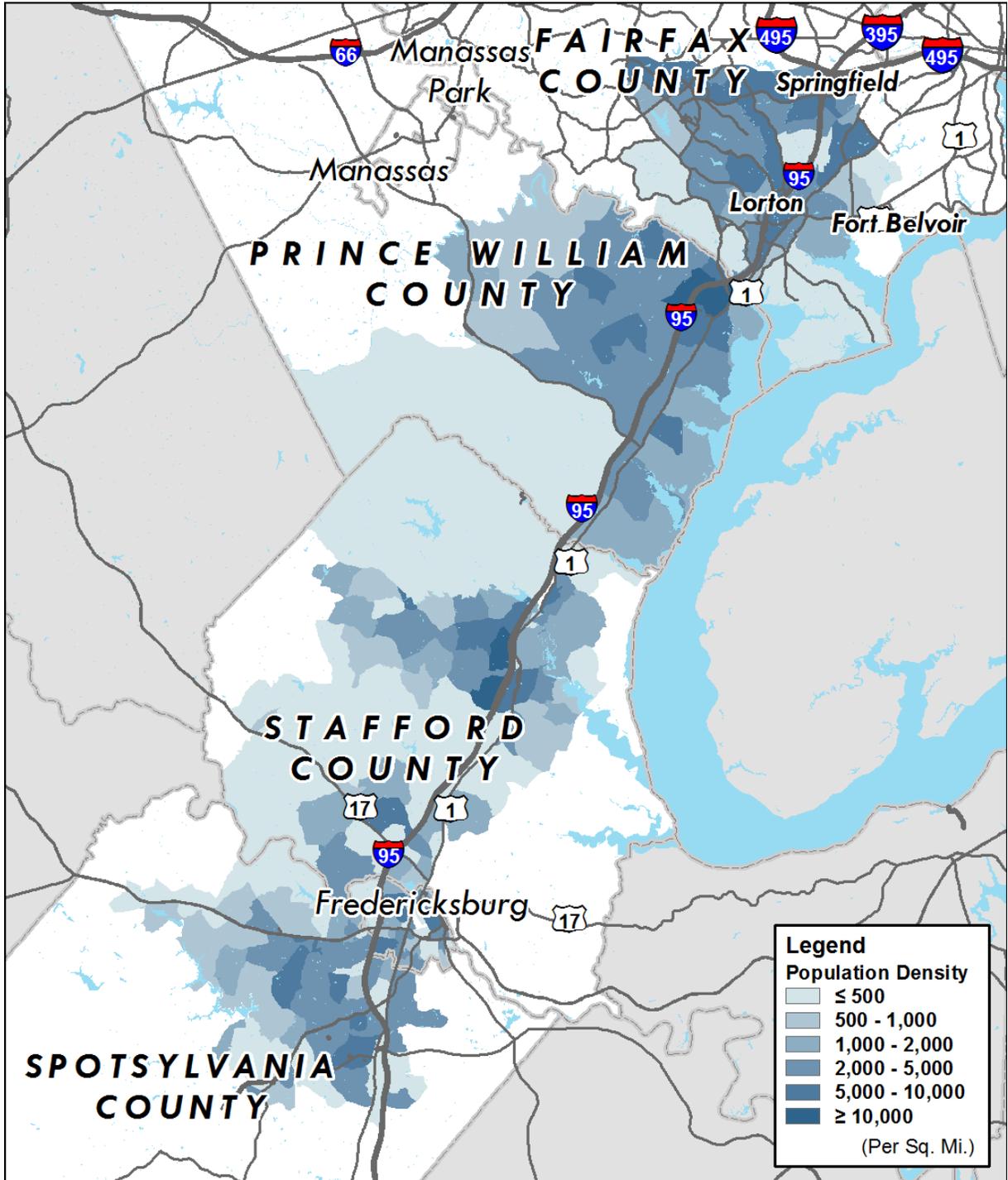


Figure 3-2
 2035 Employment Densities in I-95 Corridor

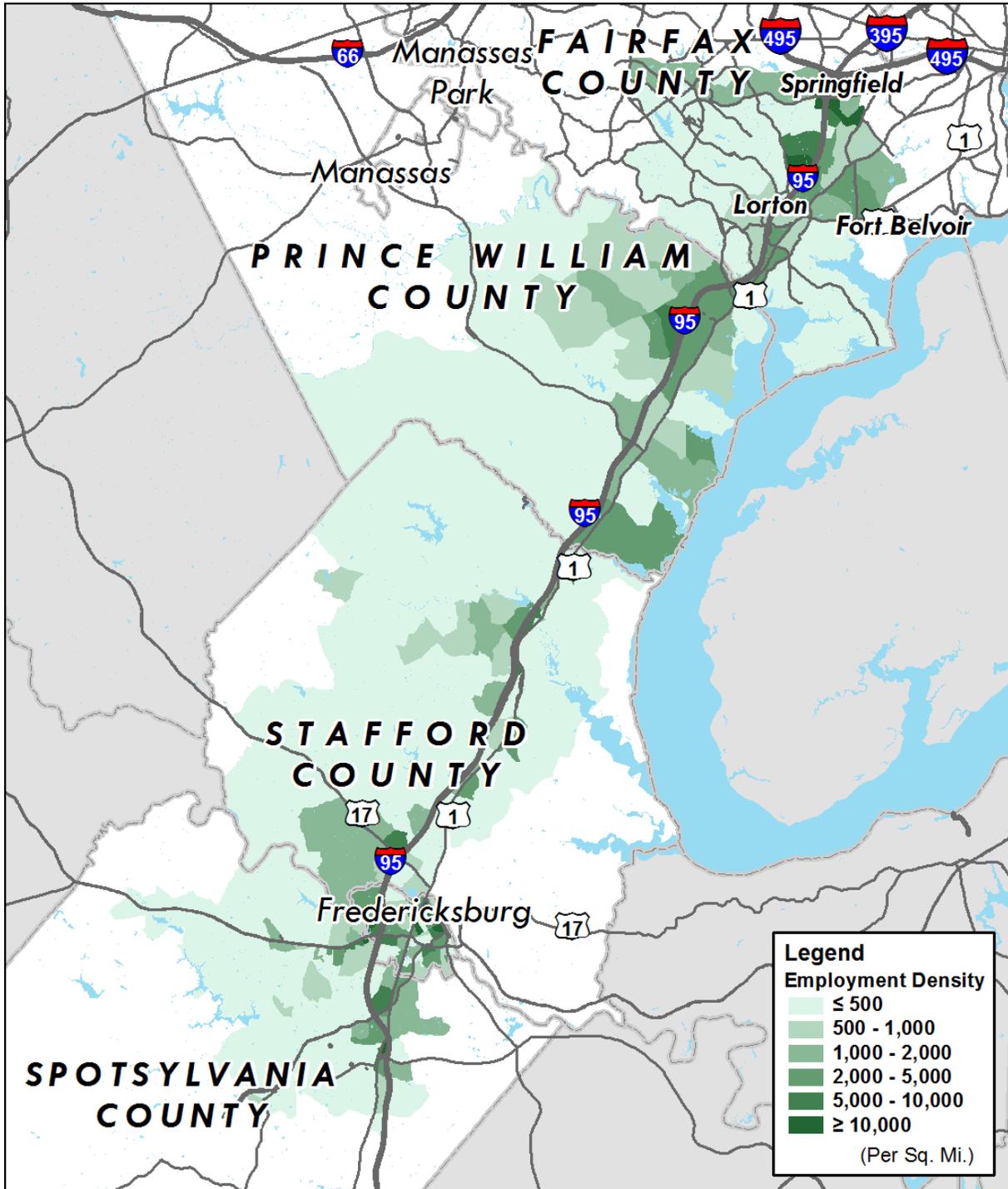


Figure 3-3
2009 Minority Population in I-95 Corridor

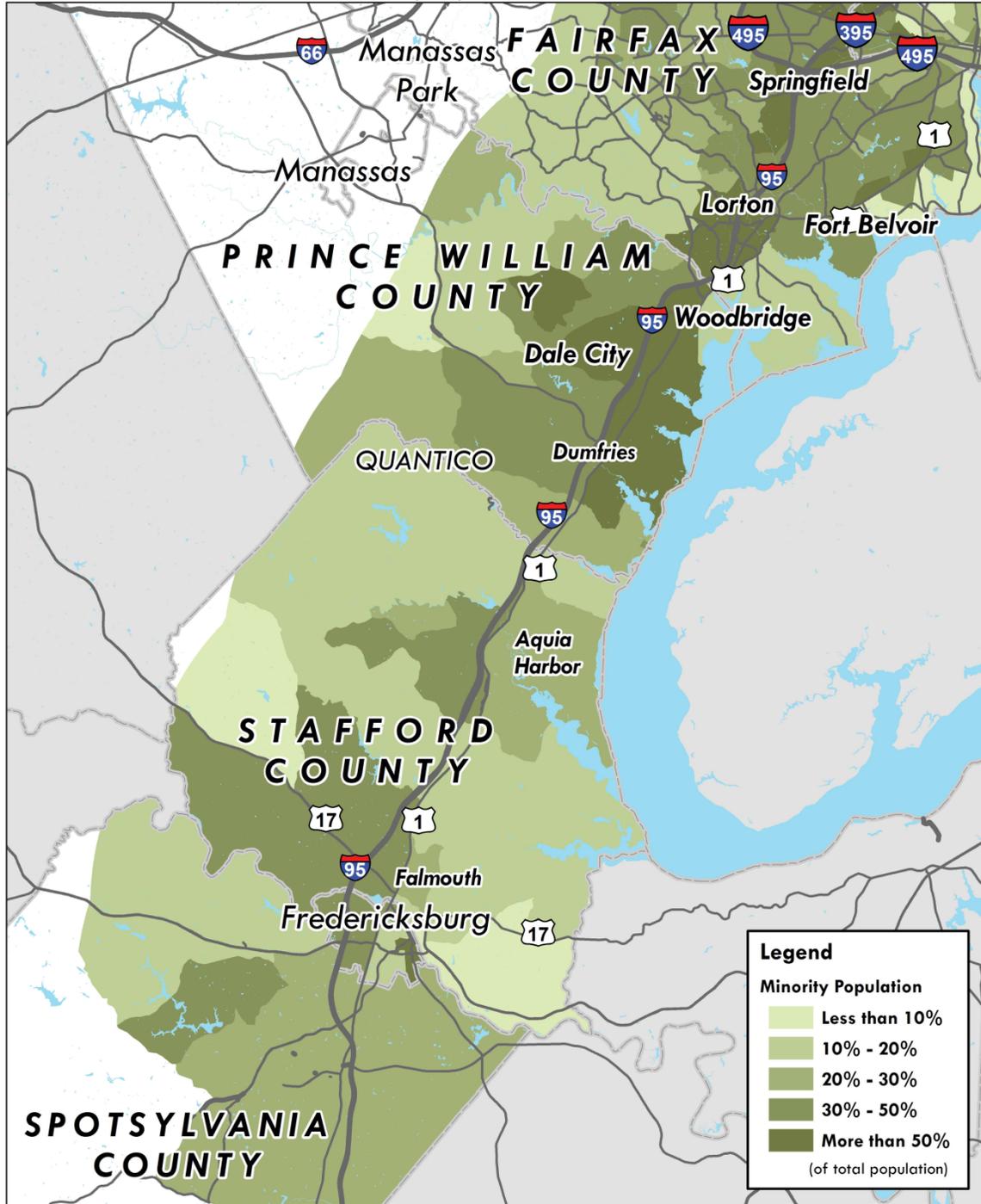
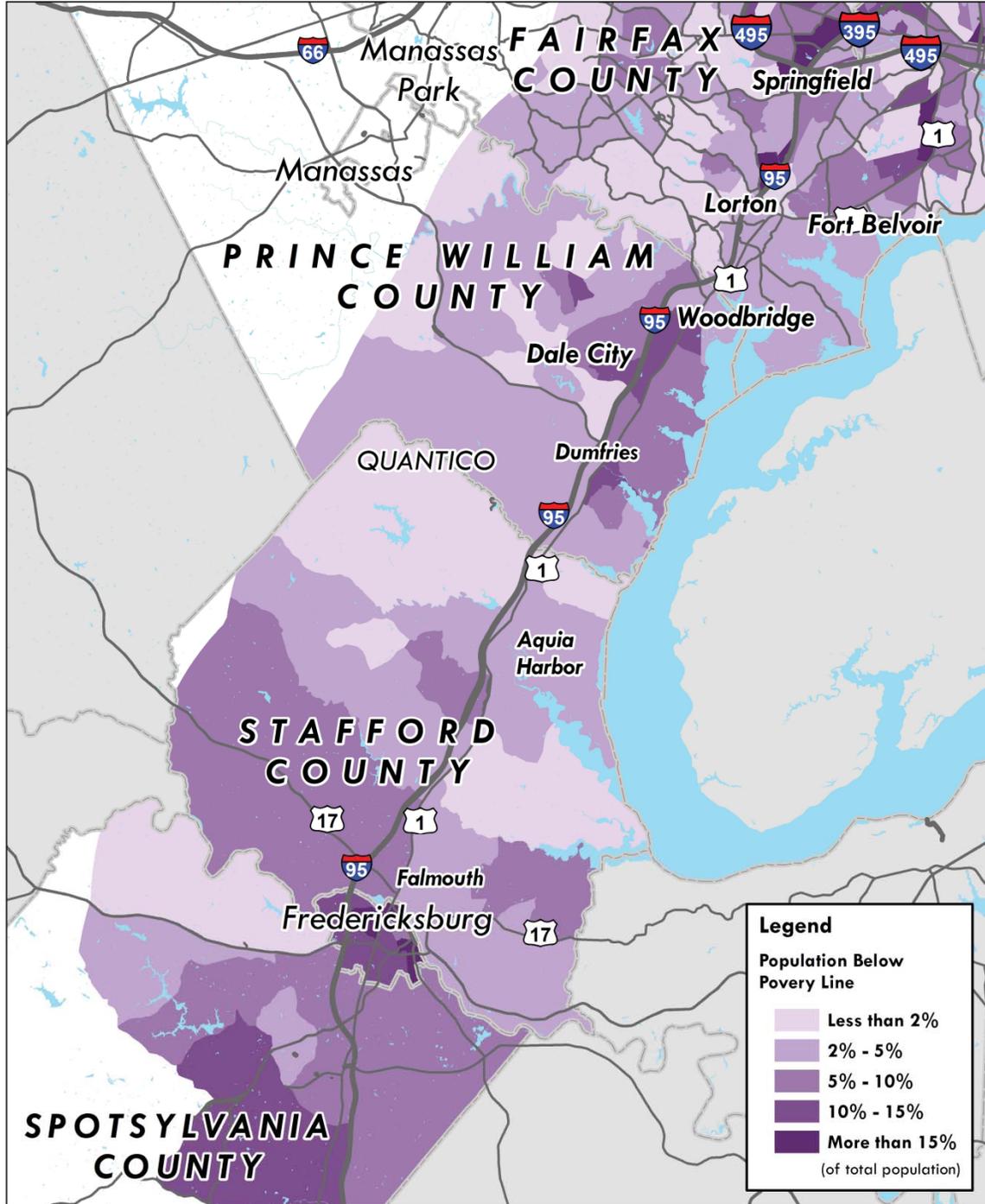


Figure 3-4
2009 Households Below Poverty in I-95 Corridor



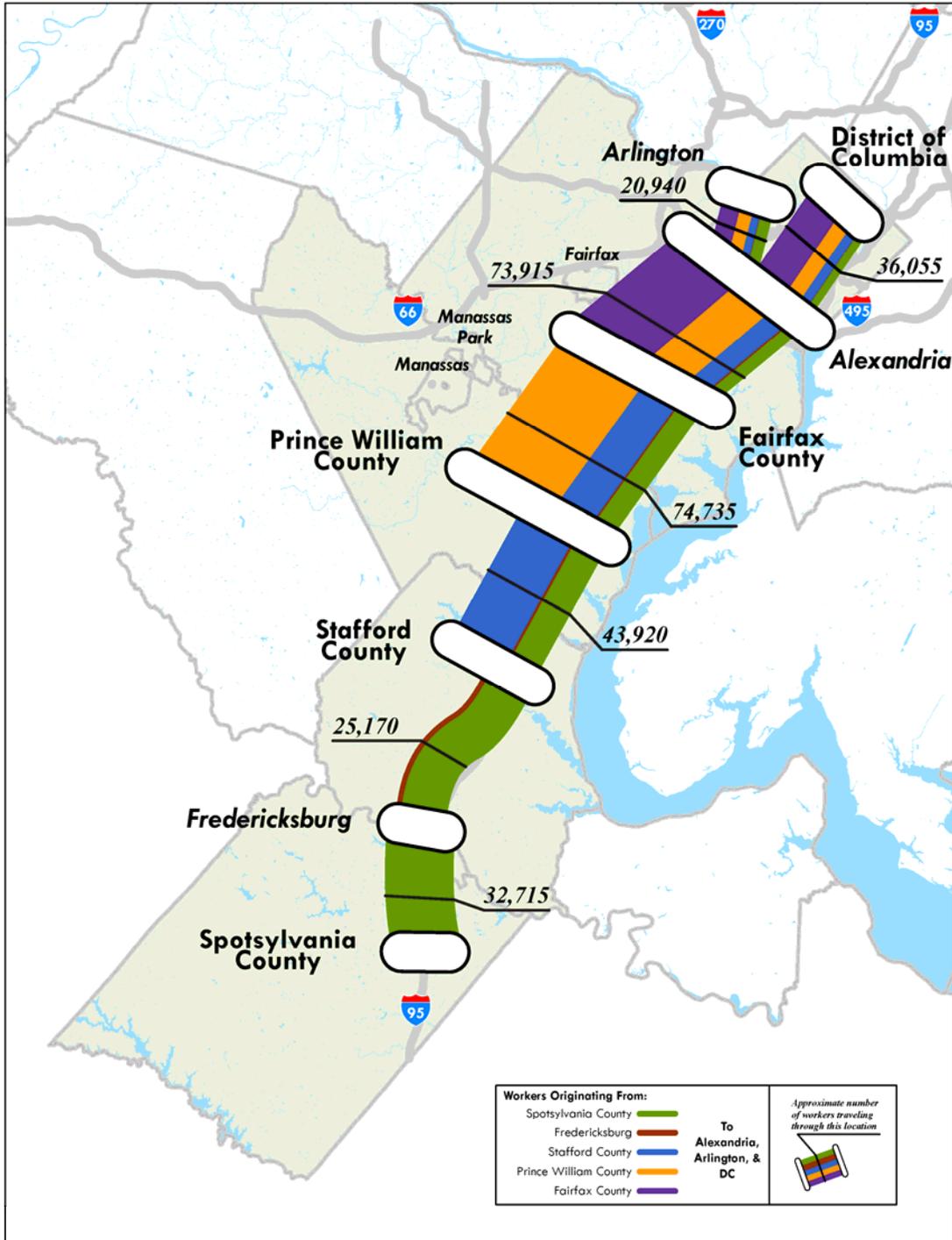
3.2 Existing Worker Travel Flows

Journey to work (i.e., home to work) travel flow information for the I-95 corridor was collected from the Census Transportation Planning Products (CTPP) program. The CTPP contains tabulated census demographic data that has been specially tabulated for transportation planners and other professionals who deal with the movement of people. The CTPP data used in this analysis is the most recently released and is based on the 2006-2008 Three-Year American Community Survey (ACS) data. Specifically, worker travel flow data was compiled from the CTPP.

Figure 3-3 shows worker flows for the I-95 corridor. Depicted worker flow data from southern Prince William County is shown in orange, while southern Fairfax County worker flow data is shown in purple. Depicted worker flow data from Spotsylvania County is shown in green, City of Fredericksburg is shown in maroon and Stafford County is shown in blue.

As shown in the figure, worker flows are greatest where the flows are combined, between Prince William County and southern Fairfax County. Over 74,000 workers are traveling north from the southern Prince William County and southern Fairfax County areas to destinations within Alexandria, Arlington and Washington, D.C. Almost 21,000 are traveling to Arlington and 36,000 are traveling to Washington, D.C.

Figure 3-3
Estimated Existing I-95 Corridor Worker Travel Flows



Source: 2006-2008 American Community Survey Data
 Census Transportation Planning Products

4.0 Existing Transit/TDM Services and Facilities

The I-95 Corridor is served by several public and private transit service providers. There are many well-utilized park and ride lots within the corridor that support commuter bus services operated by the corridor's transit service providers. This corridor also has an extensive array of TDM programs in place that help reduce the number of single occupant vehicles on I-95. Following are general descriptions of existing transit services, park and ride facilities and TDM programs within the I-95 corridor. More detailed descriptions can be found in *Technical Memorandum #1*.

4.1 Corridor Transit Service Providers

Transit service providers in the I-95 corridor consist of:

- Fairfax Connector
- Washington Metropolitan Area Transit Authority (WMATA)
- Potomac and Rappahannock Transportation Commission (PRTC)
- FREDericksburg Regional Transit (FRED)
- Quick's Bus Company
- Martz Group
- Virginia Railway Express (VRE)

Quick's and Martz are private bus companies; the other five are public transit providers. Following are brief descriptions of services provided by each service provider. More detailed descriptions can be found in *Technical Memorandum #1*.

Fairfax Connector presently operates one route that uses I-95/I-395 to/from the Pentagon – Route 380D. This route is to be re-labeled as Route 395. All other Fairfax Connector routes in the corridor are local routes, with most providing service to and from the Franconia-Springfield Metrorail station.

WMATA: There is one Metrorail Station in the corridor –the Franconia-Springfield Station – located along Franconia-Springfield Parkway, just east of I-95 (south of the Springfield Mall). This station is the end-of-line station for the Blue Line. Route 18 is the primary Metrobus route that serves the I-95/I-395 corridor to/from the Pentagon. There are several line patterns for Route 18. Other Metrobus routes operate to and from the Franconia-Springfield Metrorail station. Routes that connect to the Franconia-Springfield Metrorail Station tend to be well-utilized.

PRTC offers a comprehensive network of commuter and local bus services in Prince William County. OmniRide is PRTC's commuter bus service. PRTC operates 10 commuter bus routes in the I-95 corridor from the Woodbridge, Dale City, Lake Ridge, Montclair and Dumfries communities. Destinations include downtown Washington, D.C., the Pentagon, Crystal City, Rosslyn/Ballston, Capitol Hill, the Navy Yard area and Tysons Corner. PRTC OmniRide routes are well utilized, with over 5,800 average daily passenger trips. Metro Direct is a commute and reverse commute bus service that provides service to Metrorail stations. PRTC operates one Metro Direct route in the I-95 corridor – from Lake Ridge to the Franconia-Springfield Metro Station. The PRTC Metro Direct route that operates in this corridor carries over 800 average daily passenger trips.

PRTC OmniRide routes typically start at park and ride lot locations away from the I-95 corridor and circulate through neighborhoods before stopping at a park and ride lot immediately adjacent to I-95. Buses are typically less than ½ full when arriving at an I-95 park and ride lot. These buses, however, tend to leave full from the I-95 park and ride lot. Thus, passengers are drawn more to the lots closest to I-95.

PRTC's ability to attract more ridership on OmniRide routes is limited by two factors – park and ride lot capacities and limitations at the existing bus maintenance facility. Many of the lots served by OmniRide routes are at or near capacity. PRTC also does not have the ability to expand bus storage or maintenance at its existing bus maintenance facility. PRTC is moving forward with plans to construct a second bus maintenance facility in the western portion of the county, which will free up capacity at its existing facility. The western maintenance facility is anticipated to be operational in late 2015/early 2016.

FRED provides fixed route transit service with deviations to the Fredericksburg area, including the City of Fredericksburg, Spotsylvania, Stafford, Caroline and King George Counties. Included in FRED's array of transit services are VRE feeder services to the Fredericksburg VRE Station.

Quick's and Martz: Quick's provides commuter service from Spotsylvania and Stafford counties to the Washington, D.C. area. Most of Quick's route patterns provide service to destinations outside of the Washington, D.C. core. Quick's operates 10 commuter bus trips in the a.m. and 10 in the p.m.

Martz provides 14 commuter trips in the a.m. and 14 in the p.m. from the Fredericksburg region. Nearly all Martz bus trips serve the central core of Washington, D.C. Most of the park and ride lots in Stafford and Spotsylvania counties are served by both Quick's and Martz.

Martz and Quick's routes are estimated to carry 800 to 900 passenger trips in each peak period (i.e., 1,600 to 1,800 daily one-way passenger trips). This reflects an average of 30 to 40 passengers per bus trip. Martz and Quick's round trip fares are \$24 to \$28 for a one-day ticket. PRTC's fares for a round trip are \$10.50 with a SmarTrip card and \$14 cash. Thus, there are likely residents from the southern portion of the corridor that drive to Prince William County lots to use OmniRide service, as that service is less expensive and more frequent.

VRE provides commuter rail service in the corridor from Fredericksburg to Union Station in Washington, D.C. VRE stations located in Fairfax County are: Franconia-Springfield and Lorton. Stations that are within Prince William County are: Woodbridge, Rippon and Quantico. Brook and Leeland Road stations are located in Stafford County. Fredericksburg is located in downtown Fredericksburg. VRE operates seven inbound and seven outbound trips. In addition to VRE-operated trips, VRE has an Amtrak Cross Honor agreement in place with select Amtrak trains. VRE park and ride utilization rates tend to be higher at the south end of the rail line, with many station lots operating at capacity.

VRE is well-utilized, with over 10,000 trips a day. Many VRE train trips are operating with standing passenger loads. VRE's potential to expand ridership is primarily limited by its available passenger car fleet, midday storage availability and parking availability at rail station parking lots.

Figure 4-1 presents a.m. and p.m. peak period bus trips that operate on I-95/I-395 by the above-noted service providers and estimated average daily ridership on the I-95 commuter buses. It is important to note that this is not a comprehensive listing of all bus trips on I-95/I-395. Other public and private transit operators also utilize I-95/I-395 and are not reflected in this figure.

4.2 Corridor Park and Ride Lots

VDOT owns or leases several park and ride lots in the I-95 corridor. In some cases, this is supplemented by County-owned park and ride lots and other private lots with leasing arrangements. Most lots are served by transit, and many are also used by carpools, vanpools and sluggers. **Figures 4-2 through 4-4** illustrate park and ride lot locations in the I-95 corridor. **Table 4-1** below presents approximate park and ride space totals by county and occupancy/utilization rates. It is important to note that many individual lots are operating at or beyond capacity. Those lots tend to be lots located close to I-95, well-served by transit and utilized by vanpoolers. Specific park and ride lot utilization rates are presented in *Technical Memorandum #1*.

Table 4-1
I-95 Corridor Park and Ride Lot Spaces by Jurisdiction
(Non-Rail Parking Lots)

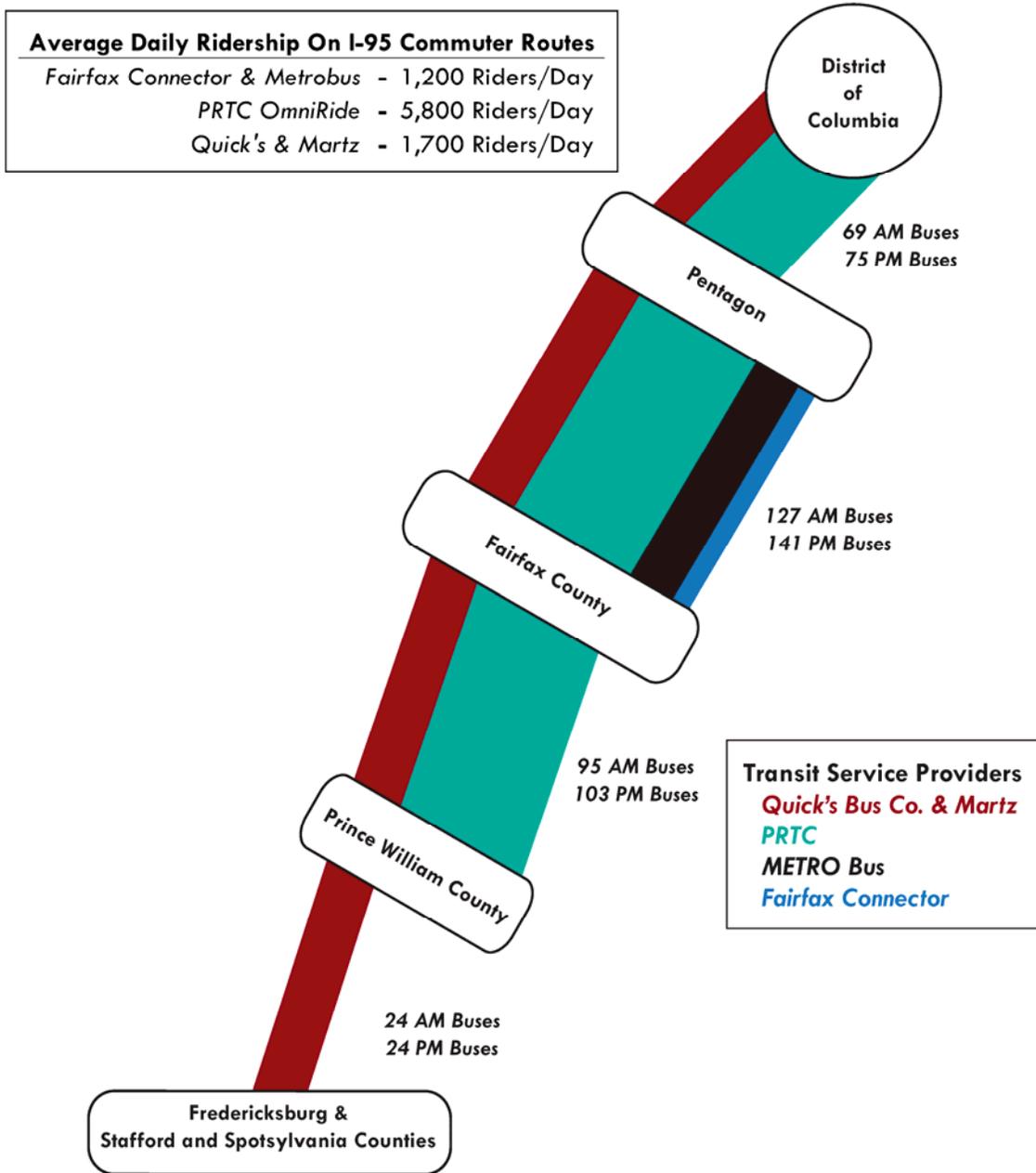
Jurisdiction	Park and Ride Spaces	Cumulative Utilization Rate
Fairfax County	2,806	66%
Prince William County	7,741	85%
Stafford and Spotsylvania Counties	5,525	85%

Bus service and TDM Program expansion cannot happen without a concurrent expansion of park and ride lots. Many of the major parking and ride lots in the corridor are at capacity, or close to capacity. In particular, lots that are served by transit with several capacity constraints are:

Springfield Plaza	PRTC Transit Center
Horner Road	Garrisonville Rd./Staffordborough Blvd.
US 1/Route 234	Garrisonville Rd./Mine Road
Lake Ridge	Stafford (VA 630)
Old Bridge Rd./Route 123	Route 3/Gordon Road
Potomac Mills	Route 3/Salem Church Road
Tackets Mill	

VDOT has plans to expand park and ride lot capacity in the corridor. Many of VDOT's expansion plans address needs identified in the prior I-95/I-395 Transit and TDM Plan. VDOT is proceeding with plans to add two lots in the north portion of the corridor that will provide 1,300 spaces and with plans to add up to 2,000 spaces at south corridor park and ride lots.

**Figure 4-1
I-95/I-395 Peak Period Commuter Service Bus Trips
By I-95 Corridor Transit Service Providers**



Note: Bus volumes shown in figure reflect bus trips originating from the I-95 corridor, south of I-495. Other bus services also operate in this corridor and are not reflected in this figure.

**Figure 4-2
Fairfax County Park and Ride Lot Locations**

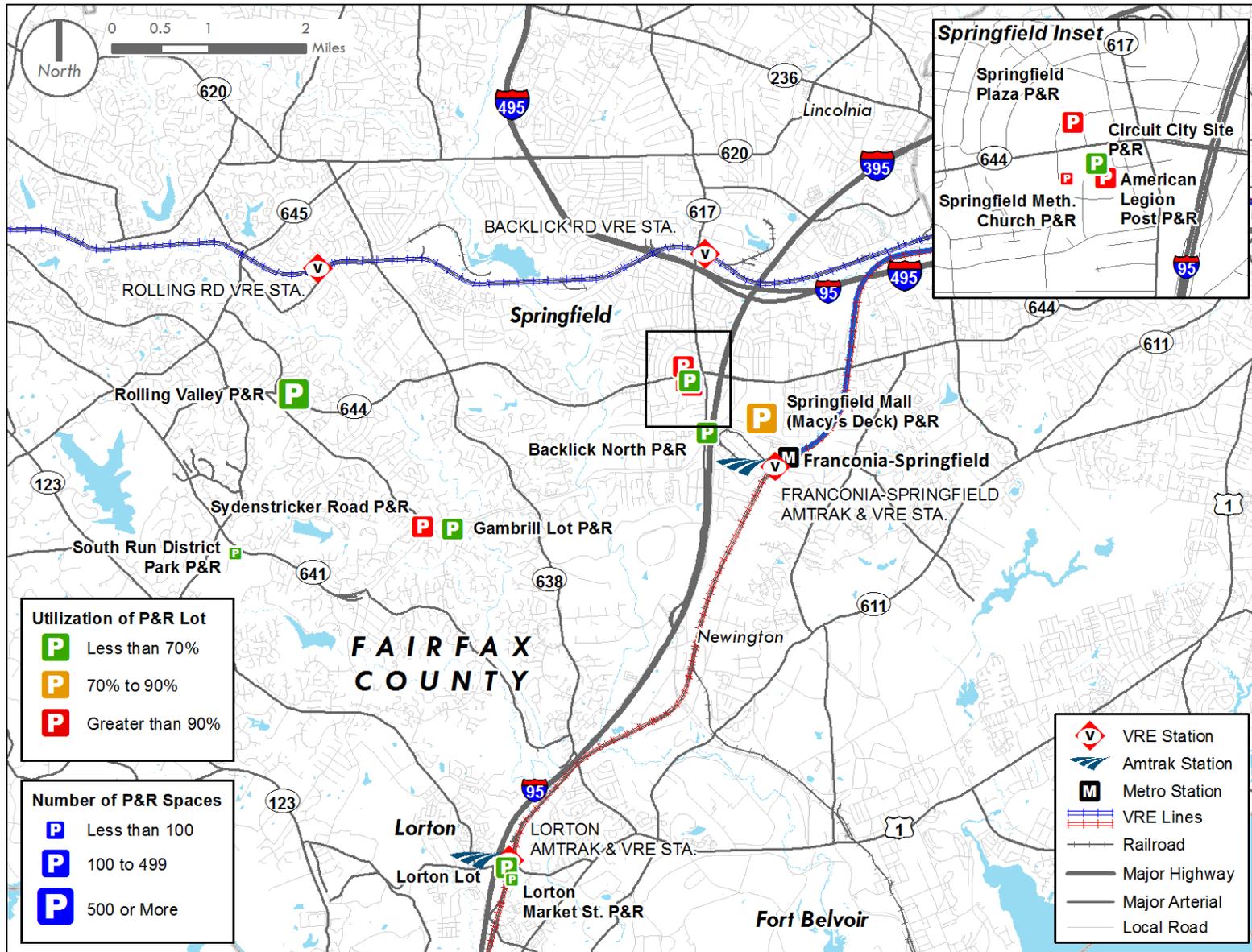
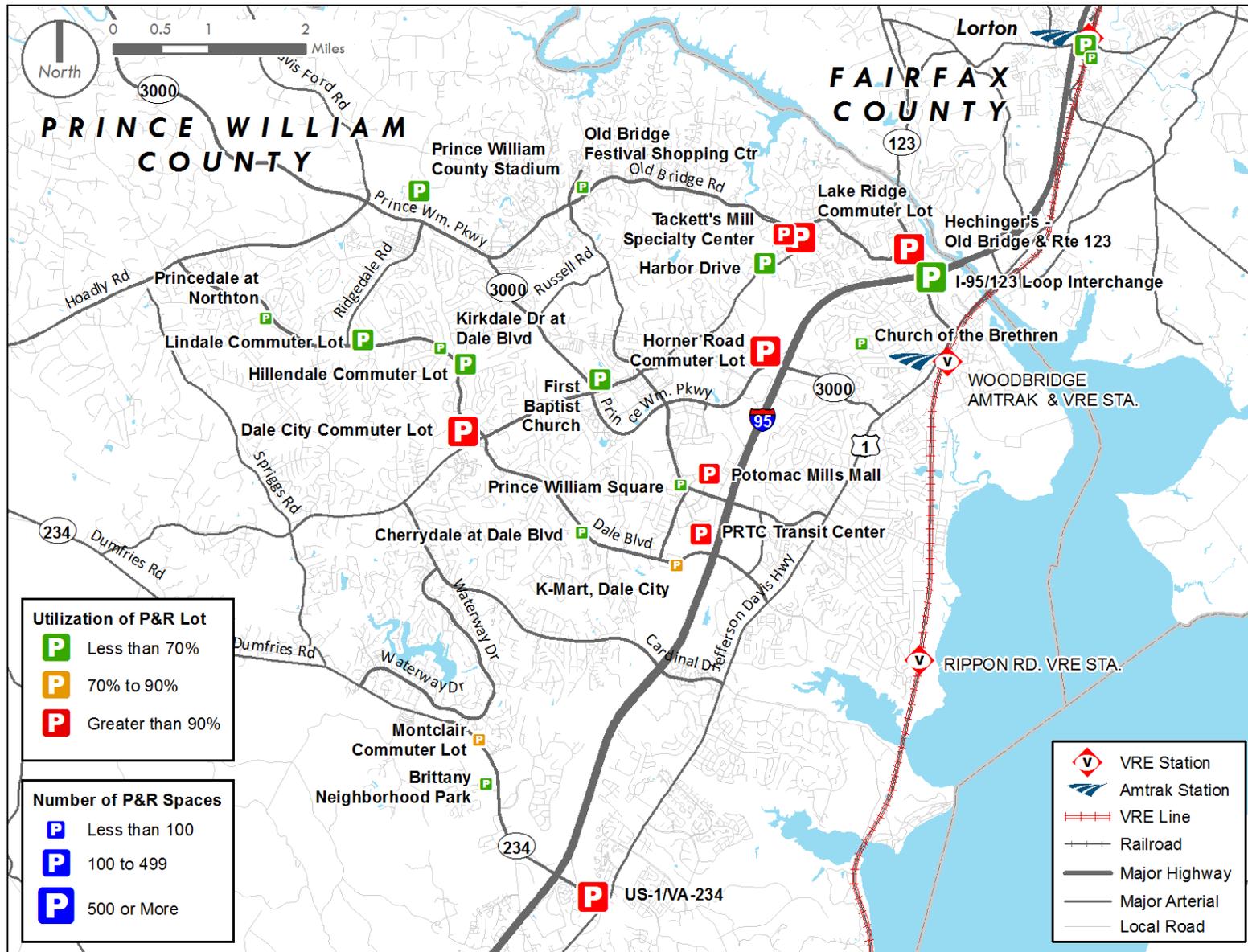
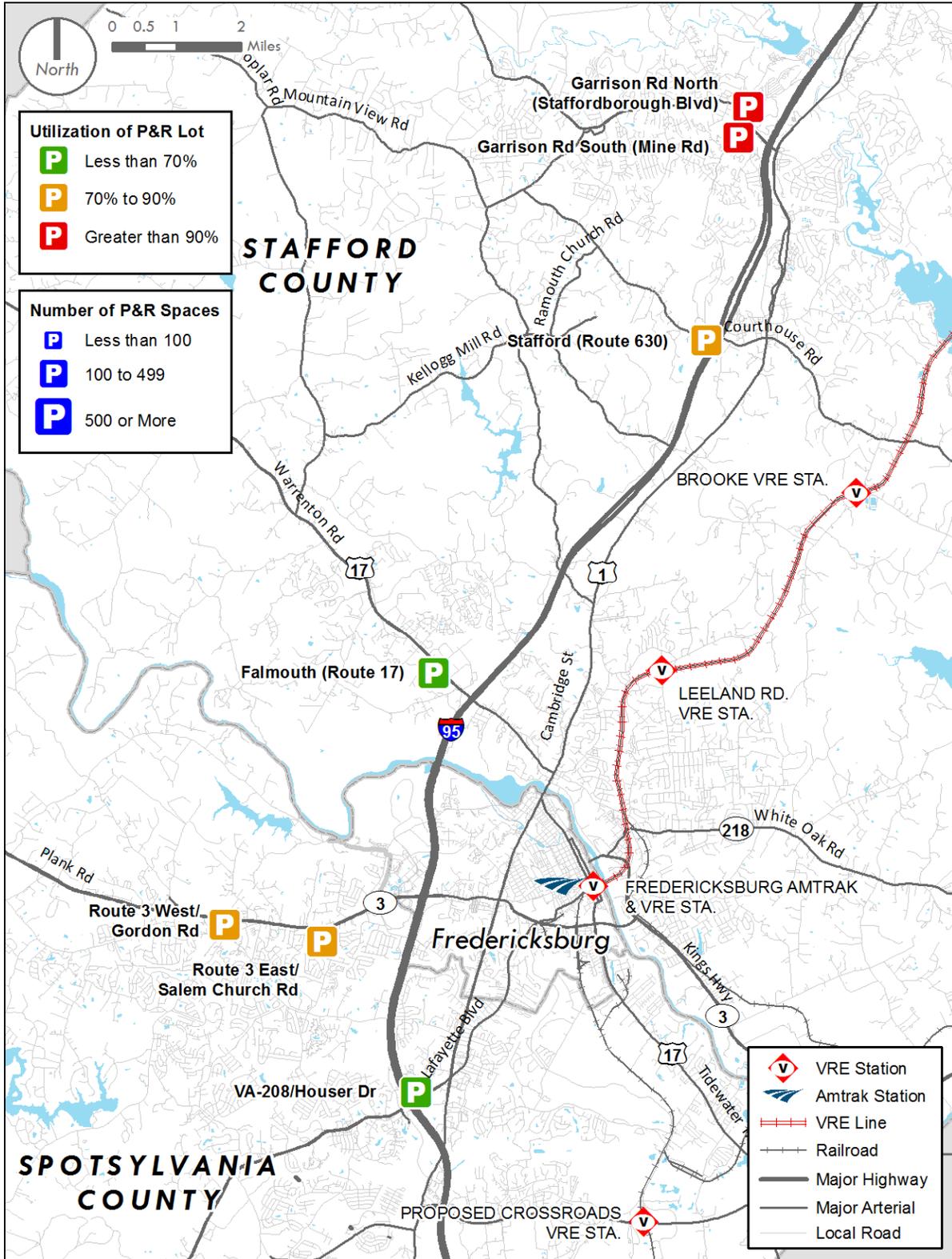


Figure 4-3
 Prince William County Park and Ride Lot Locations



**Figure 4-4
Stafford and Spotsylvania County Park and Ride Lot Locations**



4.3 TDM Programs

Several TDM programs are in place in the I-95 corridor that have reduced single occupant vehicle usage in the corridor. Telework continues to grow in popularity in the Washington, D.C. area. There are a few privately operated telework centers in operation in the corridor. Dynamic ridesharing (slugging) also continues to grow in this corridor. A 2009 survey by VDOT estimates that there are 6,450 sluggers that originate from 15 locations in the corridor. About 25 percent of sluggers originate from the Horner Road Lot. About one third of all sluggers are destined to the Pentagon.

Commuter Connections serves as an umbrella agency for local TDM programs. TDM agencies within the corridor include Alexandria's Local Motion, the Fairfax County Transportation Services Group, OmniMatch and GWRideConnect. These TDM agencies provide employer services that are aimed at reducing single occupant vehicle travel. Both OmniMatch and GWRideConnect administer large vanpool programs, with GWRideConnect overseeing more than 400 vanpools.

Finally, it is important to note that the corridor's BRAC projects include funding for a Transportation Management Program Office that will be responsible for promoting alternatives to single occupant vehicle travel.

5.0 I-95 Corridor Plan Recommendations

An analysis of I-95 corridor transit and TDM program needs was completed and documented in *Technical Memorandum #2*. Needs were identified as those that directly maximize I-95 HOT/HOV lane capacity and other I-95 corridor needs. Following is a summary of costs and phasing recommendations for improvements that directly maximize I-95 HOT/HOV lane capacity, as presented in *Technical Memorandum #3*.

5.1 Park and Ride Lot Recommendations

As discussed in *Technical Memorandum #2*, a district-level assessment of existing park and ride lot utilization and anticipated expansion needs resulted in the determination of needs that are greater than what was proposed in the prior *I-95/I-395 Transit and TDM Study*. Expansion needs that are anticipated to address existing lot capacity deficiencies and anticipated population growth within the I-95 travel shed corridor are as follows:

Additional Space Needs in North Corridor Area	4,000 spaces
<u>Additional Space Needs in South Corridor Area</u>	<u>5,575 spaces</u>
Total Estimated Park and Ride Space Requirement	9,575 spaces

As noted in previous technical memoranda, VDOT is proceeding with plans to construct 3,300 spaces. Thus, the estimated net additional need is for **6,275 spaces** (or 9,575 minus 3,300).

The park and ride phasing recommendations acknowledge that the 3,300 spaces VDOT is proceeding with for the I-95 corridor (funded spaces) are anticipated to be complete by approximately 2015, with the 1,300 spaces in the north corridor area (i.e., Telegraph Road and Saratoga lot) complete in 2012-2013 and the 2,000 spaces in the south corridor area (i.e., Route 3/Gordon Road and Garrisonville Road/Staffordborough Boulevard) complete by approximately 2015.

The remaining 6,275 needed spaces are assumed to be implemented in five-year increments from 2020 to 2030, as shown in **Table 5-1** and **Figure 5-1**. Phasing of these spaces is cognizant of bus transit service phasing discussed in the next section, as well as discussions with VDOT regarding park and ride priorities.

Expansion of park and ride lot spaces has been recommended by geographic area/district. However, it is important that there be flexibility for VDOT and local jurisdictions to work together to adjust locations of additional park and ride spaces as necessary during more detailed park and ride lot siting analyses, based on more current estimates of demand, land availability and transit service. Further, FAMPO is presently finalizing a park and ride lot study that is identifying potential locations for new park and ride lots and/or expansion of existing lots. Recommendations from that study effort should be utilized when identifying potential locations for the additional park and ride spaces that are recommended from this study effort.

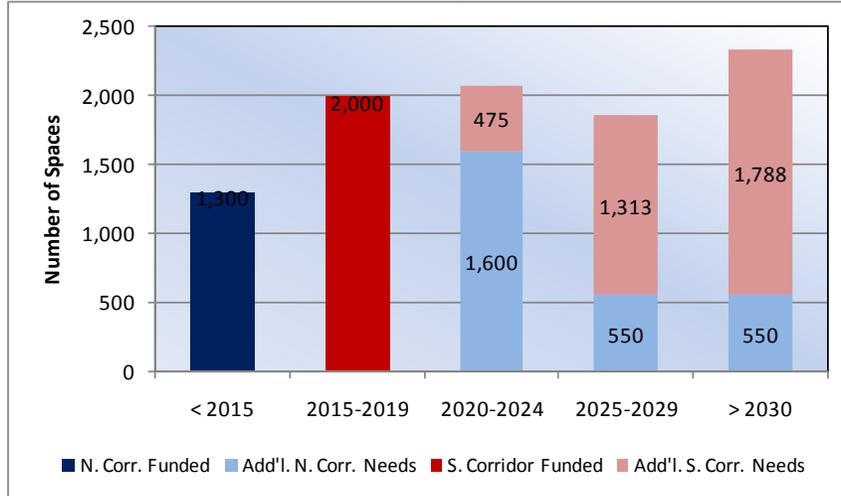
**Table 5-1
Park and Ride Lot Phasing Recommendations
(Number of Spaces)**

Geographic Area	Improvement Description	< 2015	2015-2019	2020-2024	2025-2029	2030-2034	Total
Fairfax District	Saratoga Lot* (2013) Additional Needs	600		250			600 250
Prince William District 1	Additional Needs				550	550	1,100
Prince William District 2	Telegraph Rd* (2012) Additional Needs	700		950			700 950
Prince William District 3	Additional Needs			400			400
Stafford District 1	Staffordborough Rd. Lot Expansion* (2015) Additional Needs		1,000		650	650	1,000 1,300
Stafford District 2	Additional Needs			475		475	950
Fredericksburg & Spotsylvania District	Route 3 (2017)* Additional Needs		1,000		663	663	1,000 1,325
TOTALS		1,300	2,000	2,075	1,863	2,338	9,575
<i>Previously Committed Spaces:</i>		1,300	2,000	0	0	0	3,300
<i>Additional Recommended Spaces:</i>		0	0	2,075	1,863	2,338	6,275

Notes:

1. Lots with (*) are already programmed for construction by VDOT.

**Figure 5-1
Park and Ride Lot Phasing Recommendations**

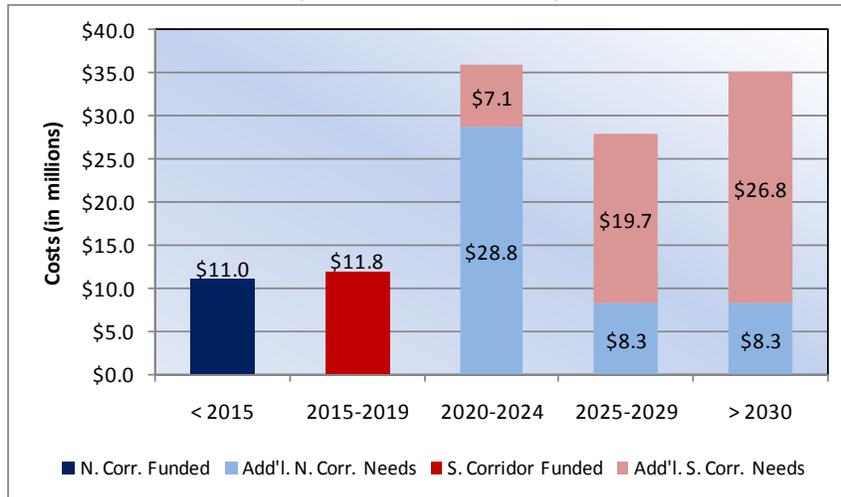


North Corridor defined as Fairfax and Prince William Counties, South Corridor as Spotsylvania & Stafford Counties

Total capital costs are estimated to be \$121.7 million for the 9,575 park and ride spaces needed in the I-95 travel shed corridor (in 2011 dollars). Of this total, \$22.8 million is committed towards the 3,300 spaces with which VDOT is proceeding, leaving \$98.9 million to be included in the State’s Six-Year Improvement Program. **Figure 5-2** present estimates of capital costs by phasing increment. Total estimated capital costs (in current year dollars) for the additional spaces by five-year increment are as follows:

- Between 2015 and 2020, \$35.9 million
- Between 2020 and 2025, \$27.9 million
- Between 2025 and 2030, \$35.1 million
- **Total 2015 to 2030= \$98.9 million**

**Figure 5-2
Park and Ride Lot Phased Capital Cost Estimates
(Costs in 2011 dollars)**



North Corridor defined as Fairfax and Prince William Counties, South Corridor as Spotsylvania & Stafford Counties

5.2 Bus Transit Expansion Recommendations

The prior *I-95/I-395 Transit and TDM Study* identified a need for significant expansion of bus services in the corridor. As discussed in *Technical Memorandum #2*, the process of validating and modifying the prior study's stated bus service needs involved comparing the prior recommendations to current service plan proposals, understanding existing bus service utilization (e.g., bus loads), assessing demographic forecasts for each district in relation to transit service levels and discussing potential service needs with service provider staff. From this effort, *Technical Memorandum #2* identified a refined set of bus service needs for the corridor.

The recommendations for bus transit service expansion include only those route improvements that would directly utilize the I-95 HOT/HOV lanes. The recommended improvements include expansion of commuter services from Spotsylvania, Stafford, Prince William and Fairfax counties. These improvements would serve destinations such as central Washington, D.C., the Pentagon area, Rosslyn, Mark Center, Tysons Corner, Fort Belvoir North and the Franconia-Springfield Metrorail Station.

The service plans recommended in this study are based on an analysis of needs that took into consideration existing service utilization, corridor demographic growth and discussions with corridor service providers. As service providers proceed with implementation of expanded service, flexibility for the local service providers will be important, with service patterns and service levels adjusted as necessary based on a more current assessment of ridership demand.

It is important to note that there are capacity constraints at the Pentagon transit center and in the Crystal City/Pentagon City area. As noted in *Technical Memorandum #2*, potential strategies that may need to be explored to accommodate any further expansion at these locations include:

- Careful scheduling management that redistributes bus trips outside of the “peak of the peak” time periods.
- Splitting trips that presently serve multiple destinations into two or more routes, thus increasing seat capacity to each destination.
- Routing new trips to the Franconia-Springfield Metrorail Station instead of the Pentagon, with passengers continuing their trip via the Metrorail Blue Line. Coordination will be required with WMATA, Fairfax Connector and Department of Defense (DoD) shuttle service at this station.
- Longer-term, consideration of an off-site bus staging area at the Pentagon and possibly a transit center near the Crystal City Metro Station, with ITS measures in place that could possibly increase bus bay utilization.

Finally, it is important to note this study's transit service expansion recommendations for Stafford and Spotsylvania Counties assume the continuation of privately operated transit service in the future, and that demand will exist for these private operators to expand service at a rate consistent with population growth. At some point in the future, consideration may need to be given to public participation in the provision of commuter bus service in Stafford and Spotsylvania Counties, to ensure the continuation and expansion of transit with service levels and service patterns beneficial for the I-95 corridor.

Table 5-2 presents the estimated annual revenue-hours and proposed implementation year for the bus service expansion routes. The listing of route improvements are divided between committed service improvements and those that are additional service needs. Committed service improvements are

assumed to be implemented prior to 2015, and include routes in Fairfax and Prince William counties, as well as BRAC-related service improvements. The additional service needs have been phased into five-year increments from 2015 through 2030, drawing from adopted Transit Development Plans (TDPs) and population growth projections. The total proposed increase in annual revenue-hours for services that would operate in the I-95 HOT/HOV lanes is 45,008. **Figure 5-3** illustrates the proposed level of commuter bus service by county of origin and by destination. **Tables 5-3** and **5-4** summarize commuter bus service levels by peak period.

A total of 40 additional buses are required to implement the non-committed service improvements that would utilize the I-95 HOT/HOV lanes. A total of \$19.4 million would be required to purchase peak buses and spares for the non-committed service improvements utilizing the I-95 HOT/HOV lanes (in 2011 dollars). Note that these additional bus requirements do not take into account bus life cycles and bus replacement costs over the plan's timeframe.

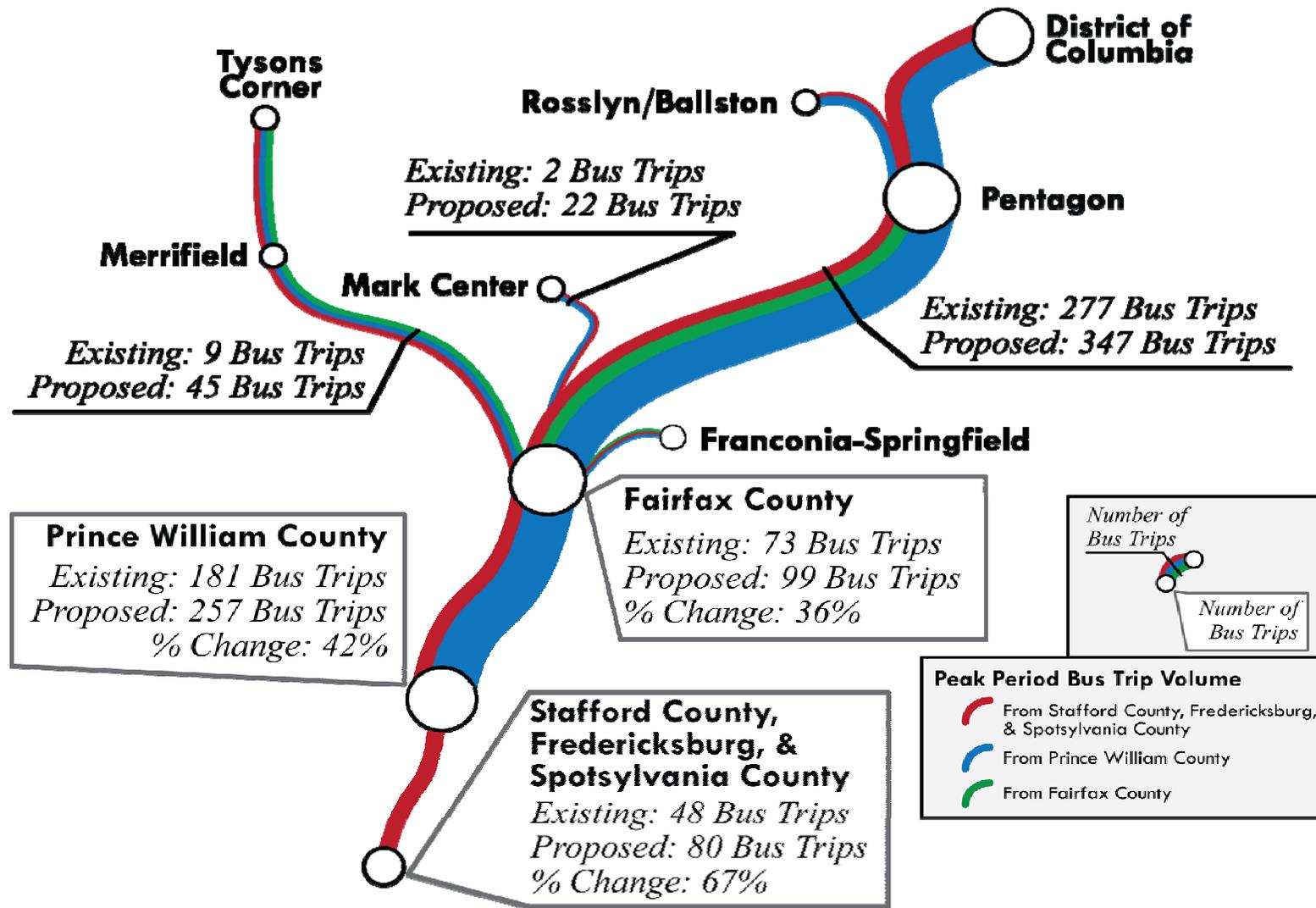
Figure 5-4 summarizes the estimated annual operations & maintenance (O&M) costs for the bus service expansion routes. **Table 5-5** presents estimated O&M costs for each bus service expansion route. This table does not include costs associated with service improvements that are already committed for implementation. An average annual O&M cost of \$120 per revenue-hour has been assumed based on a review of current costs for WMATA, Fairfax Connector and PRTC. The calculations of net O&M costs reflect net O&M costs after fare collection, based on assumed farebox recovery ratios for the various services/operators (noted in footnotes of the tables).

The total estimated annual net O&M cost for all improvements associated with routes that operate in the I-95 HOT/HOV lanes is \$2.29 million (in 2011 dollars). **Table 5-3** also presents the cumulative O&M costs through 2035, taking into account the proposed implementation year (e.g., an improvement proposed for 2020 would have 15 cumulative years of O&M). The additional net O&M costs through 2035 are estimated at \$31.5 million for routes that would operate in the I-95 HOT/HOV lanes (in 2011 dollars).

**Table 5-2
Bus Service Expansion Recommendations – Revenue-Hours and Phasing**

Geographic Area	Imprpr. Status	Operator	Improvement Description	Annual Revenue-Hrs.	Impl. Year
Fairfax County	Committed Service Improvements	Fairfax	Re-label Route 380-D as Route 395	Service Plans	< 2015
		Fairfax	I-495 HOT Lane Service - Lorton-Tysons	currently under	< 2015
		Fairfax	I-495 HOT Lane Service - Franconia/Springfield-Tysons	development	< 2015
	Additional I-95 Corridor Service Needs	WMATA	Route 18 G/H/J/P Restructuring	0	2015
		WMATA	Extension of Route 18E/F to Saratoga pnr	1275	2015
		Fairfax	Restructure Tysons service to stop at Saratoga pnr	765	2015
		Fairfax	New: Saratoga-Pentagon Express - 5 a.m. and 5 p.m. trips	1,913	2020
SubTotal			3,953		
Prince William County	Committed Service Improvements	OmniRide	Add 8 morning and three afternoon OmniRide trips to address current overcrowding issues	Service Plans currently under development	< 2015
	Additional I-95 Corridor Service Needs	OmniRide	Lake-Ridge-Washington, D.C. - add 3 a.m. and 4 pm. trips	2,678	2025
		OmniRide	Lake Ridge-Pentagon/Crystal City - add 3 a.m. and 3 p.m. trips	2,295	2025
		OmniRide	New Service - Lake Ridge to Mark Center - 4 a.m. and 4 p.m. trips	3,060	2015
		OmniRide	Dale City/Potomac Mills-Washington, D.C. - add 4 a.m. and 5 p.m. trips	3,443	2020
		OmniRide	Dale City/Potomac Mills-Pentagon/Crystal City - add 3 a.m. and 4 p.m. trips	2,678	2025
		OmniRide	Dale City/Potomac Mills-Rosslyn/Balston - add 2 a.m. and 2 p.m. trips	1,530	2020
		OmniRide	New Service: Dale City/Potomac Mills-Mark Center - 4 a.m. and 4 p.m. trips	3,060	2015
		OmniRide	New Service: Dale City/Potomac Mills-Merrifield - 4 a.m. and 4 p.m. trips	3,060	2020
		OmniRide	Monclair/Dumfries-Pentagon/DC - Add 2 a.m. and 3 p.m. trips	1,913	2030
		OmniRide	New Service: Montclair/Dumfries-Tysons Corner - 4 a.m. and 4 p.m. trips	3,060	2030
		MetroDirect	Prince William MetroDirect - Increase peak period frequencies to 20-min.	2,040	2020
		SubTotal			28,815
Stafford and Spotsylvania Counties	Additional I-95 Corridor Service Needs	Private Op's.	Washington D.C. Service - add 6 trips each peak period	4,590	2020
		Private Op's.	Pentagon/Crystal City Service - add 2 trips each peak period	1,530	2020
		Private Op's.	Mark Center Service - add 2 trips each peak period	1,530	2020
		Private Op's.	Navy Yard/DOT Service - add 1 trip each peak period	765	2025
		Private Op's.	Rosslyn Service - add 2 trips each peak period	1,530	2025
		Private Op's.	Fort Belvoir Service - add 1 trip each peak period	765	2015
		Private Op's.	Tysons Corner Service - new service, 2 trips each peak period	1,530	2025
SubTotal			12,240		
TOTALS				45,008	

Figure 5-3
I-95 Corridor Bus Trip Volumes



**Table 5-3
Increase in Commuter Bus Trips by County of Origin**

Commuter Trip Origins:	AM Peak Period Trips			PM Peak Period Trips		
	Existing	Proposed	% Change	Existing	Proposed	% Change
Stafford/Spotsylvania Counties	24	40	67%	24	40	67%
Prince William County	82	118	44%	99	139	40%
Fairfax County	33	46	39%	40	53	33%
Total	139	204	47%	163	232	42%

Notes:

Fairfax Connector proposed trips include I-495 Tysons Express Routes

Prince William County trips include MetroDirect service to Franconia-Springfield

**Table 5-4
Increase in Commuter Bus Trips by Destination**

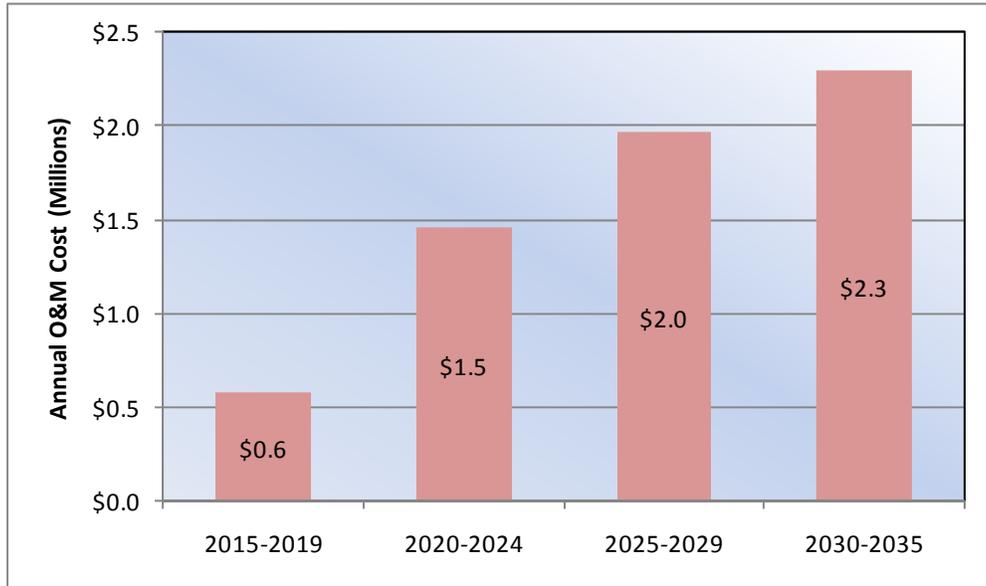
Commuter Trip Destinations:	AM Peak Period Trips			PM Peak Period Trips		
	Existing	Proposed	% Change	Existing	Proposed	% Change
Central D.C. Area	127	160	26%	150	187	25%
Mark Center	1	11	1000%	1	11	1000%
Tysons	4	22	450%	5	23	360%
Other	7	11	57%	7	11	57%
Total	139	204	47%	163	232	42%

Notes:

Destinations included in "Other" are: Fort Belvoir, Franconia-Springfield

Capacity constraints at Pentagon may necessitate the need for commuter trips to be routed to other destinations, such as Franconia-Springfield

Figure 5-4
Net Annual O&M Costs for Bus Service Recommendations by Five-Year Increment
(2011 dollars)



**Table 5-5
Bus Service Expansion Recommendations – O&M Cost Estimates (2011 dollars)**

Geographic Area	Impr. Status	Operator	Improvement Description	Annual O&M Cost	Potential Farebox	Net O&M Cost	Impl. Year	Total O&M thru 2035	Farebox thru 2035	Net Costs thru 2035	
Fairfax County	Committed Service Improvements	Fairfax	Re-label Route 380-D as Route 395				< 2015			Committed Project	
		Fairfax	I-495 HOT Lane Service - Lorton-Tysons				< 2015			Committed Project	
		Fairfax	I-495 HOT Lane Service - Franconia/Springfield-Tysons				< 2015			Committed Project	
	Additional I-95 Corridor Service Needs	WMATA	Route 18 G/H/J/P Restructuring	\$0	\$0	\$0	2015	\$0	\$0	\$0	
		WMATA	Extension of Route 18E/F to Saratoga pnr	\$153,000	\$46,000	\$107,000	2015	\$3,060,000	\$920,000	\$2,140,000	
		Fairfax	Restructure Tysons service to stop at Saratoga pnr	\$92,000	\$28,000	\$64,000	2015	\$1,840,000	\$560,000	\$1,280,000	
		Fairfax	New: Saratoga-Pentagon Express - 5 a.m. and 5 p.m. trips	\$230,000	\$69,000	\$161,000	2020	\$3,450,000	\$1,035,000	\$2,415,000	
SubTotal			\$475,000	\$143,000	\$332,000		\$8,350,000	\$2,515,000	\$5,835,000		
Prince William County	Committed Service Improvements	OmniRide	Add 8 morning and three afternoon OmniRide trips to address current overcrowding issues				< 2015			Committed Project	
		OmniRide	Lake-Ridge-Washington, D.C. - add 3 a.m. and 4 p.m. trips	\$321,000	\$144,000	\$177,000	2025	\$3,210,000	\$1,440,000	\$1,770,000	
	Additional I-95 Corridor Service Needs	OmniRide	Lake Ridge-Pentagon/Crystal City - add 3 a.m. and 3 p.m. trips	\$275,000	\$124,000	\$151,000	2025	\$2,750,000	\$1,240,000	\$1,510,000	
		OmniRide	New Service - Lake Ridge to Mark Center - 4 a.m. and 4 p.m. trips	\$367,000	\$165,000	\$202,000	2015	\$7,340,000	\$3,300,000	\$4,040,000	
		OmniRide	Dale City/Potomac Mills-Washington, D.C. - add 4 a.m. and 5 p.m. trips	\$413,000	\$186,000	\$227,000	2020	\$6,195,000	\$2,790,000	\$3,405,000	
		OmniRide	Dale City/Potomac Mills-Pentagon/Crystal City - add 3 a.m. and 4 p.m. trips	\$321,000	\$144,000	\$177,000	2025	\$3,210,000	\$1,440,000	\$1,770,000	
		OmniRide	Dale City/Potomac Mills-Rosslyn/Balston - add 2 a.m. and 2 p.m. trips	\$184,000	\$83,000	\$101,000	2020	\$2,760,000	\$1,245,000	\$1,515,000	
		OmniRide	New Service: Dale City/Potomac Mills-Mark Center - 4 a.m. and 4 p.m. trips	\$367,000	\$165,000	\$202,000	2015	\$7,340,000	\$3,300,000	\$4,040,000	
		OmniRide	New Service: Dale City/Potomac Mills-Merrifield - 4 a.m. and 4 p.m. trips	\$367,000	\$165,000	\$202,000	2020	\$5,505,000	\$2,475,000	\$3,030,000	
		OmniRide	Monclair/Dumfries-Pentagon/DC - Add 2 a.m. and 3 p.m. trips	\$230,000	\$104,000	\$126,000	2030	\$1,150,000	\$520,000	\$630,000	
		OmniRide	New Service: Montclair/Dumfries-Tysons Corner - 4 a.m. and 4 p.m. trips	\$367,000	\$165,000	\$202,000	2030	\$1,835,000	\$825,000	\$1,010,000	
		MetroDirect	Prince William MetroDirect - increase peak period frequencies to 20-min.	\$245,000	\$49,000	\$196,000	2020	\$3,675,000	\$735,000	\$2,940,000	
		SubTotal			\$3,457,000	\$1,494,000	\$1,963,000		\$44,970,000	\$19,310,000	\$25,660,000
		Stafford and Spotsylvania Counties	Additional I-95 Corridor Service Needs	Private Op's.	Washington D.C. Service - add 6 trips each peak period	\$551,000	\$551,000	\$0	2020	\$8,265,000	\$8,265,000
Private Op's.	Pentagon/Crystal City Service - add 2 trips each peak period			\$184,000	\$184,000	\$0	2020	\$2,760,000	\$2,760,000	\$0	
Service Needs	Private Op's.		Mark Center Service - add 2 trips each peak period	\$184,000	\$184,000	\$0	2020	\$2,760,000	\$2,760,000	\$0	
	Private Op's.		Navy Yard/DOT Service - add 1 trip each peak period	\$92,000	\$92,000	\$0	2025	\$920,000	\$920,000	\$0	
	Private Op's.		Rosslyn Service - add 2 trips each peak period	\$184,000	\$184,000	\$0	2025	\$1,840,000	\$1,840,000	\$0	
	Private Op's.		Fort Belvoir Service - add 1 trip each peak period	\$92,000	\$92,000	\$0	2015	\$1,840,000	\$1,840,000	\$0	
	Private Op's.		Tysons Corner Service - new service, 2 trips each peak period	\$184,000	\$184,000	\$0	2025	\$1,840,000	\$1,840,000	\$0	
	SubTotal			\$1,471,000	\$1,471,000	\$0		\$20,225,000	\$20,225,000	\$0	
TOTALS				\$5,403,000	\$3,108,000	\$2,295,000		\$73,545,000	\$42,050,000	\$31,495,000	

Notes:

1. Costs in 2011 dollars
2. Costs based on a cost per revenue hour assumption of \$120
3. Assumed farebox recovery ratios for each operator are as follows:
 - a. Local routes 20% Assuming 20% farebox recovery/80% subsidy
 - b. Fairfax express 30% Assuming 30% farebox recovery/70% subsidy
 - c. PRTC 45% Consistent with PRTC TDP assumptions
 - d. Stafford/Spotsy 100% Assumes 100% recovery under private operations

5.3 TDM Program Recommendations

As discussed in *Technical Memorandum #2*, the TDM needs from the prior *I-95/I-395 Transit and TDM Study* have been revisited and refined in light of new programs, updated plans for existing programs and discussions with corridor TDM staff. The identified TDM needs can be categorized as follows:

- Vanpool Program Assistance
 - VanStart/VanSave
 - Vanpool Insurance
 - NTD Program
- Telework Program Assistance
- I-95 Corridor Marketing/Education
 - Annual Marketing Campaigns
 - HOT/HOV Start-up Campaigns
- TDM Program Staffing
- Technology Upgrades
- Supporting Programs
 - Guaranteed Ride Home
 - Incentive Programs

Currently, Transportation Efficiency Improvement Fund (TEIF) monies are utilized to fund the local TDM programs. No additional funding is available to implement these recommendations. The TDM recommendations detailed in *Technical Memorandum #2* will be implemented to the extent possible using any unobligated TEIF funds that remain at the end of each fiscal year or any other funding that becomes available. Since available funding will vary from year to year, it is not possible to determine the timeframe or extent of implementation of these recommendations.

5.4 Destination-End Facility Recommendations

As discussed in *Technical Memorandum #2*, it is important not to lose sight of potential infrastructure impacts and needs at I-95 commuter trip destinations both south and north of I-495. Within the I-95 corridor, the assessment revealed the destination-end facility needs as summarized below.

Mark Center

Although technically not within the I-95 Corridor, this facility has been included because it is located just north of the defined corridor, and is anticipated to be a major travel destination for trips from the corridor. As noted in *Technical Memorandum #1*, actions taken through the 2005 BRAC Act are resulting in 6,400 additional military personnel at the Mark Center. A Transportation Management Plan was prepared that includes actions intended to reduce single occupant vehicle trips to/from the Mark Center. To encourage transit usage, a transit center has been constructed within the Mark Center that includes five bus bays. WMATA and DASH already have plans in place to serve the Mark Center (discussed in *Technical Memorandum #2*). Potential service expansion plans presented in this study will increase commuter bus trips to/from the Mark Center, with those bus trips being able to utilize the planned I-95 HOV ramp to/from Seminary Road. A review of proposed bus service levels indicate that there should be sufficient capacity to accommodate commuter bus service expansion, as proposed in

this study. However, there is little room for further expansion of bus service, and bus operations at the transit center will need to be carefully managed.

Franconia-Springfield Metrorail Station

There are presently five bays at Franconia-Springfield Metrorail station, with these bays utilized by Metrobus, Fairfax Connector and PRTC. The DoD will also be operating shuttle service from this station to the Mark Center and Fort Belvoir North. WMATA staff is presently in the planning process for adding two or three bays at this station through a Transportation Investment Generating Economic Recovery (TIGER) Grant. Potential service expansion plans presented in this study will increase PRTC Metro Direct trips and possibly commuter bus trips to/from this station. A review of proposed bus service levels indicate that there should be sufficient capacity to accommodate bus service expansion at this station, as proposed in this study. However, coordination will still be needed in the assignment of bus service to bus bays at this station, as there are also planned service increases at this station by the Fairfax Connector and by DoD shuttles.

There are also over 5,100 on-site parking spaces that are fully-utilized. There are no travel demand forecasts available to determine potential additional parking demands at this station. However, concern has been expressed by stakeholders about potential increased demands from Single Occupant Vehicle (SOV) commuters that might exit the HOT lanes on I-95 and complete their trip via the Blue Line (since the HOT lanes will end north of I-495 and there is a reduction from three to two HOV lanes). To address this need, a strategy has been identified to expand off-site parking and provide shuttle service between the off-site parking and the Franconia-Springfield Station. For purposes of this study, 750 off-site spaces have been assumed as structured parking. Specific demand will need to be determined through further analysis with the regional travel demand model. **Table 5-6** presents estimated costs (capital and O&M) associated with this strategy.

Costs for the proposed 750 off-site parking spaces total \$22.5 million, based on a typical unit cost of \$30,000 per structured parking space. This would be a one-time capital cost with implementation assumed in 2020 (ideally coordinated with completion of the I-95 HOT/HOV lane project into Spotsylvania County). Shuttle service would be implemented once the new off-site parking facility is opened, and has been estimated at an annual cost of \$551,000. Thus, the total cost of the parking expansion and shuttle service from 2020 through 2035 would be \$31.3 million.

**Table 5-6
Franconia-Springfield Off-Site Parking Recommendations – Estimated Costs (in 2011 dollars)**

Location	Improvement Description	Impl. Year	Project Cost
Franconia-Springfield Metrorail	Add off-site parking - 750 spaces	2020	\$22,500,000
	Shuttle Service to off-site parking (2 vehicles, 9 hours/day - 255 days/year)	Annual cost Cost thru 2035	\$551,000 \$8,265,000
TOTALS			\$31,316,000

Notes:

1. Cost for off-site parking is based on \$30,000 per parking space, reflecting a typical parking structure unit cost
2. Shuttle operation cost based on a unit cost of \$120 per revenue hour.

6.0 Summary of Plan Costs

This final section presents summaries of the costs detailed in the prior sections of this chapter. **Table 6-1** presents an overall plan summary matrix, breaking down the costs by plan element (i.e., capital costs, O&M costs, TDM costs and Franconia-Springfield Station costs). It further breaks down costs by funding commitment status. Costs presented in this table are for the plan’s entire time period (through 2035).

Table 6-1
Summary of Estimated Costs for Plan Recommendations (2011 dollars)

Plan Element	Plan Cost
Capital Costs	
Current Funded Park & Ride Spaces	\$22,800,000
Additional Park & Ride Spaces	\$98,875,000
Bus Fleet Expansion	\$19,370,000
O&M Costs (thru 2035)	\$31,495,000
TDM Program Costs (thru 2035)	TBD
Franconia Springfield Station	
Off-Site Parking	\$22,500,000
Off-Site Parking Shuttle	\$8,265,000
Total Costs	\$203,305,000
<i>Previously Committed Funds:</i>	<i>\$22,800,000</i>
<i>Recommended for Six-Year Program</i>	<i>\$180,505,000</i>

Table 6-2 focuses only on additional costs recommended for inclusion in the State’s Six-Year Improvement Program by plan element and five-year increment for I-95 related costs. Total costs by plan element and by time period are also illustrated in **Figure 6-1** and **Figure 6-2**.

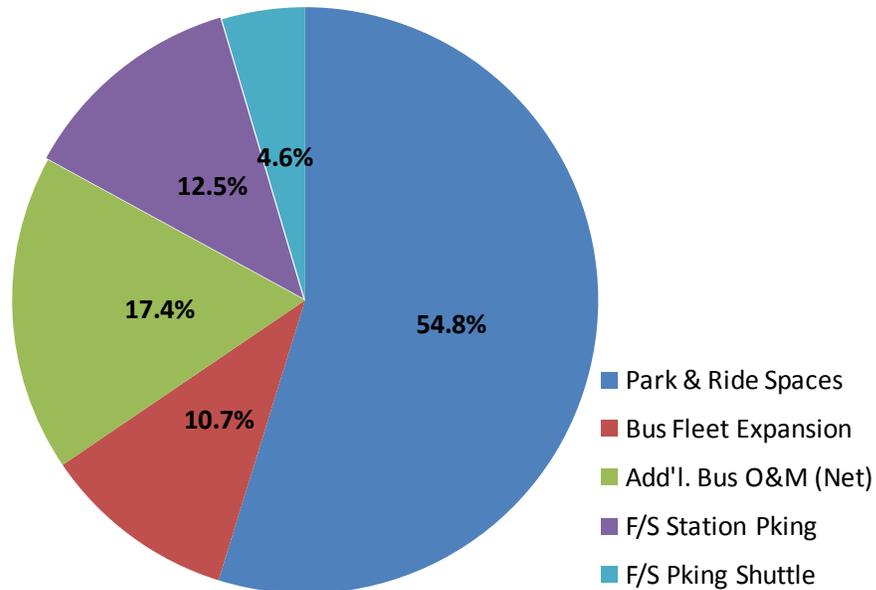
The total cost (capital and O&M) is estimated to be \$180.5 million between 2015 and 2035. By time period, total costs increase significantly from the 2015-2019 period to the 2020-2024 period and then taper off somewhat in the last two time periods. The expansion of park and ride spaces along I-95 is by far the largest component of the recommendations, at \$98.9 million (or 55%).

**Table 6-2
Summary of Recommended Funding by Plan Element and Time Period (2011 dollars)**

Plan Element	Time Period				TOTAL
	2015-19	2020-24	2024-2029	2030-2035	
Total Corridor Service/Project Needs					
Previously Funded P&R Spaces	\$22,800,000	\$0	\$0	\$0	\$22,800,000
Additional P&R Spaces	\$0	\$35,875,000	\$27,937,500	\$35,062,500	\$98,875,000
Bus Purchase Needs	\$3,076,000	\$8,182,000	\$5,312,000	\$2,800,000	\$19,370,000
Add'l. Bus O&M (Net)	\$2,875,000	\$7,310,000	\$9,835,000	\$11,475,000	\$31,495,000
TDM Programs	TBD	TBD	TBD	TBD	TBD
F-S Station Off-Site Parking	\$0	\$22,500,000	\$0	\$0	\$22,500,000
F-S Station Parking/Shuttle	\$0	\$2,755,000	\$2,755,000	\$2,755,000	\$8,265,000
Total (Funded and Recommended)	\$28,751,000	\$76,622,000	\$45,839,500	\$52,092,500	\$203,305,000
Total for Six-Year Program:	\$5,951,000	\$76,622,000	\$45,839,500	\$52,092,500	\$180,505,000

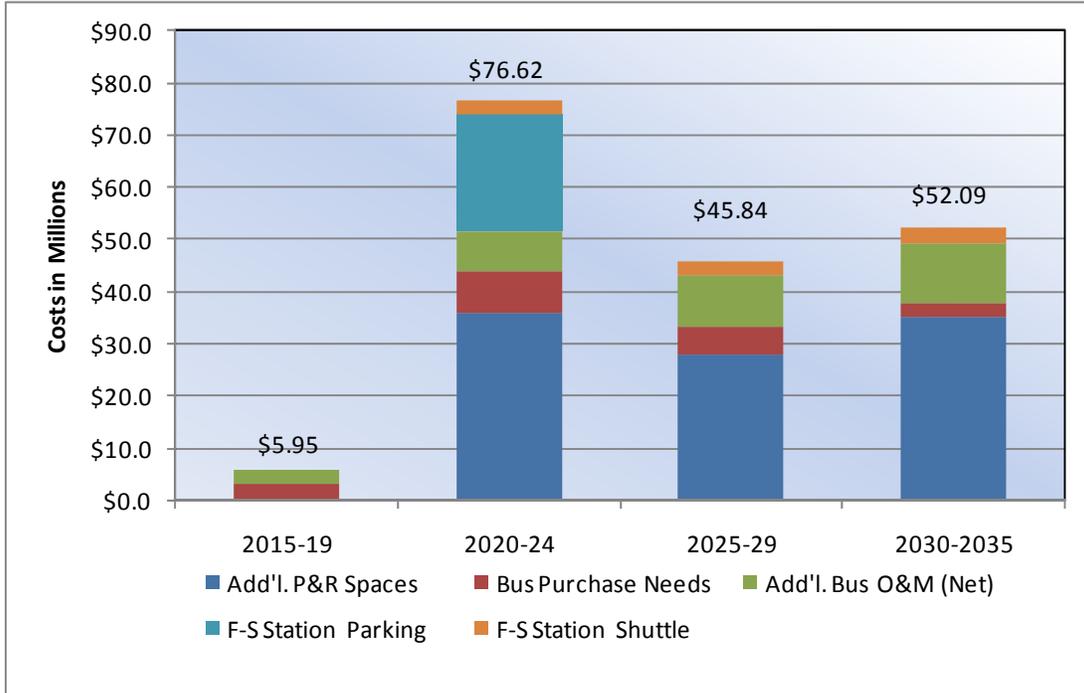
TDM Costs/Funding Needs to be determined.

**Figure 6-1
Summary of Recommended Funding by Plan Element (2011 dollars)**



TDM Costs/Funding Needs not included in above graph.

Figure 6-2
Summary of Costs by Five-Year Increment (2011 dollars)



TDM Costs/Funding Needs not included in above graph.